NATURE MAGAZINE

APRIL 1930 35¢ VOL. 15, NO. 4

BUY a NATURE BOOK THIS MONTH

Many requests received from the readers of NATURE MAGAZINE asking for the recommendation of books in the various fields of Nature and science indicates an existing demand. This demand is for books that are authentic, practical and worth adding to one's library. It is apparent that it is the duty of the AMERICAN NATURE ASSOCIATION, through these pages, to assist its members by suggesting the worthwhile volumes.

Each month this page will be published in NATURE MAGAZINE. On it will be listed books in two classifications. The first group includes those volumes of current publication regarded by the most competent authorities, consultants of this Association, as outstanding and valuable. The second group includes those books in various fields which are regarded as somewhat standard works and yet are still available from the publishers.

Consider these lists of books, your own particular interests in Nature and your present library, and add an excellent Nature book each month. *All orders must be accompanied by the price of the book or books listed below.* Send to:

BOOK EDITOR, NATURE MAGAZINE
1214 16th STREET WASHINGTON, D. C.

Nature Books of Recent Publication

IN THE ZOO—W. Reid Blair. Animal observation $2.60
THE UNIVERSE AROUND US—Sir James Jeans. Fascinating astronomy..... $4.60
MY TROPICAL AIR CASTLE—Dr. Frank M. Chapman. Tropical wild life..... $5.15
WINGS OF A BIRD—Herbert Ravenal Sass..... $2.60
NATURE NARRATIVES—Austin H. Clark..... $1.10
PERENNIALS OF FLOWERLAND—Alice T. A. Quackenbush. Who's who of perennials $1.60
INSECT WAYS—Clarence M. Weed. Fascinating stories $2.65
ROMANCE OF THE PLANETS—Mary Proctor. The skies. $2.60
BURGESS SEASHORE BOOK FOR CHILDREN—Thornton Burgess. $3.10
THE NATURAL HISTORY OF SELBORNE—Gilbert White $15.25
MUSHROOMS OF FIELD AND WOOD—Margaret McKenny. Handbook. $2.00
THE BIRD BOOK—Charles P. Shoffner. $2.00
WILD ANIMAL PETS—William and Irene Finley. $3.00
FORESTS AND MANKIND—Pack & Gill. $3.00

Recommended Books for the Nature Library

BIRDS

COLOR KEY TO NORTH AMERICAN BIRDS—Chapman. $3.65
HANDBOOK OF BIRDS OF WESTERN U. S.—Bailey. $6.25
HANDBOOK OF BIRDS OF EASTERN N. A.—Chapman. $4.15
BIRDS OF THE OCEAN—Alexander..... $3.65
PRACTICAL VALUE OF BIRDS—Henderson..... $2.60
BIRD GUIDES—Reed. (In two parts, $1.50 each)

MAMMALS

FIELD BOOK OF NORTH AMERICAN MAMMALS—Anthony..... $5.15
OUR WILD ANIMALS—Moseley..... $3.10

GARDENING

BOOK OF ANNUALS—Hottes..... $1.65
BOOK OF PERENNIALS—Hottes..... $1.65
FOUR SEASONS IN THE GARDEN—Rexford..... $2.65
ROCK GARDENS—EVERGREENS—SHRUBS—GLADIOLUS—IRISES—DAHLIAS—Rockwell..... $1.00 each

WILD PLANTS

FIELD BOOK OF AMERICAN WILD FLOWERS—Mathews. $3.65
FIELD BOOK OF COMMON GILLED MUSHROOMS—Thomas..... $3.65
FIELD BOOK OF AMERICAN TREES AND SHRUBS—Mathews..... $3.65
BOOK OF WILD FLOWERS FOR YOUNG PEOPLE—Mathews..... $2.60
WILD FLOWERS AND FERNS IN THEIR HOMES AND OUR GARDENS—Durand..... $3.65
THE FLOWER FINDER—Walton..... $3.10

ASTRONOMY

A FIELD BOOK OF THE STARS—Olcott..... $1.60
THE BOOK OF THE STARS FOR YOUNG PEOPLE—Olcott..... $2.60

REPTILES AND AMPHIBIANS

REPTILES AND AMPHIBIANS—Barbour..... $3.65

INSECTS

FIELD BOOK OF INSECTS—Lutz..... $3.15

GENERAL MANUALS

MANUAL OF THE VERTEBRATE ANIMALS OF THE NORTHEASTERN U. S.—Jordan..... $4.20

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Vacation albums are published on: 1—Pacific Northwest; 2—Yellowstone Park; 3—Alaska; 4—Dude Ranches. To those planning Western travel, one or more of these books will be promptly mailed upon request to E. E. Nelson, 210 Northern Pacific Railway, Saint Paul, Minnesota.

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Travel DEPARTMENT

THAT jovial gentleman, Chaucer, who wrote his famous *Canterbury Tales* nearly two-thirds of a millenium ago, began his best known poem with an axiom that has never failed to be true: "When that Aprille with his shoures sote the droghte of Marche hath perced to the rote . . . then longen folke to goon on pilgrimages . . ." April finds nearly every human impregnated with a desire to be out and away. Europe, New England, California, Florida, Bermuda—every port appeals more than the home shore. Distant pastures are always greener during this month of showers. More people than Browning "long to be in England, now that April's there."

* * *

The Royal Mail Steam Packet Company is offering an unusually attractive pair of Easter tours to Bermuda. These have minimum prices of $94 for the eight-day trip on the *Araguaya*, and $100 for the nine-day voyage which the *Arcadian* is to take. Four and five days respectively are allowed ashore, hotel expenses paid. The sailings are April 12 and April 18 from New York. Anyone who has not seen Bermuda should surely take advantage of this special offer.

* * *

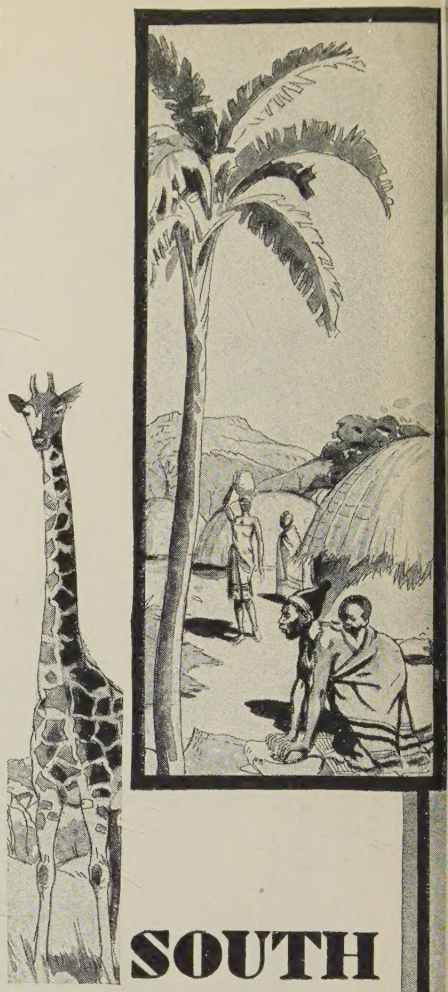
Sweden will be the scene of almost unprecedented activity during the entire summer. The mammoth gymnastic meet in Stockholm, Sweden, in which 12,000 Swedish athletes will drill, undoubtedly is to be a drawing card for Americans, especially since the Swedish system of gymnastics is such a fundamental part of the education of the youth of the Nordic nation. The results of the rigorous training undergone by Scandinavians have been seen in the most recent Olympic games. Stockholm will also be the scene of a great singing festival, to take place on July 5 and 6 in connection with the modern industrial arts exhibition, and some 7,000 Swedish vocalists and about 500 Swedish-American singers will participate.

* * *

If one is to see Europe this summer, the American Express Travel Department will make, on request, an almost unlimited number of suggestions, and their valuable booklets, "The American Traveler in Europe" and "Quality Tours to Europe", will be extremely interesting. The Express Company is now trying to help those individuals who wish to travel independently yet also desire that freedom from bothersome details which a tour affords. It likewise offers numerous tours to every corner of the continent designed to fit any pocketbook or any whim of the owner thereof.

* * *

See Page 208
for
Recommended Summer Camps



SOUTH AFRICA

Wonderfully rich in romance is the history of South Africa.

Woven into this historical fabric are the early struggles of the voortrekkers; the lives of Retief, Pretorius, Kruger, Botha, Rhodes; battles with powerful native kings; the sensational discovery of diamonds at Kimberley and gold at Johannesburg; the adventures of famous hunters and traders, and the activities of diverse races—Bantu, Portuguese, Dutch, French, English, Malay. Mysterious ruins and rock paintings remain as silent spokesmen of ancient peoples. Here also is the background of the fascinating tales of Rider Haggard and Olive Schreiner. South Africa amply repays the student of history and the seeker of new travel thrills.

See the Kruger National Park, a sanctuary for African fauna—Victoria Falls in all its incomparable glory, the wonderful Cango Caves, picturesque native life, and a host of other marvelous sights.

Every modern facility exists to insure comfortable travel. Write Director South Africa Travel Bureau, Room 657, 11 Broadway, New York City. Ask for booklet OD8.

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14 day tour of the Northwest Wonderland
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Includes new Gallatin Gateway to Yellowstone, 170 mile motor trip (no added cost) . . . four days in Park . . . Seattle, world port . . . Rainier National Park, glacier-clad monarch mountain. Spokane (Inland Empire). Other trips include Olympic Peninsula . . . Puget Sound's myriad isles . . . old-English Victoria and Vancouver . . . ice-clad Mt. Baker . . . Alaska, land of midnight sun . . . Canadian Rockies . . . California.

This very day decide where you'll vacation this Summer. Choose the Northwest wonderland, the homeland of enchantment, romance and Nature's marvelous handiwork.

Follow the trail of the new Olympian—only transcontinental roller-bearing train—electrified for 656 miles through the most scenic sections of the Belt, Rocky, Bitter Root and Cascade mountains. The world's longest electrified ride! Open observation cars! Daylight panoramas!

Select the travel mode that pleases you: independent travel, paying as you go . . . . or escorted, all-expense tour parties—one cost covering train and steamer fares, meals, hotels, sightseeing and courteous guides to look after all details en route.

Costs? Surprisingly moderate! Well within your means. A two weeks tour of the Pacific Northwest, all expenses, for as little as $250 from Chicago—thanks to low Summer fares. Can you conceive of anything more thrilling or enjoyable? Other all-expense tours, 10 days to 3 weeks, $145 and up from Chicago. Give us an inkling of your vacation ideas on coupon below. We'll submit sample escorted tours—or plan itineraries if you prefer to travel independently.

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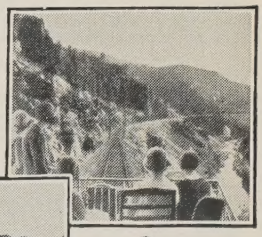

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Send me full information about tours to ☐ Yellowstone; ☐ Inland Empire (Spokane and Lake Region); ☐ Rainier National Park; ☐ Puget Sound Country; ☐ Olympic Peninsula; ☐ Alaska; ☐ Black Hills; ☐ Escorted all-expense tours.

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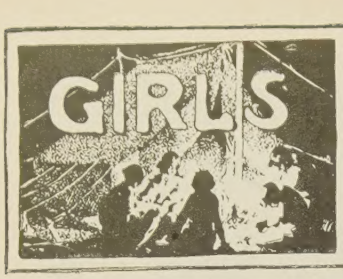

CAMPS

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On Pleasant Bay, South Orleans, Massachusetts

LEARN to sail at Quanset. Racing in safe Pleasant Bay with Cape Cod skipper. Canoeing, salt water swimming, riding, all sports. Strong organization of able counselors. Results in health building, under medical supervision. Camp farm: safe milk. Nimicutts 5-11. Quansets 12-18. Booklet.

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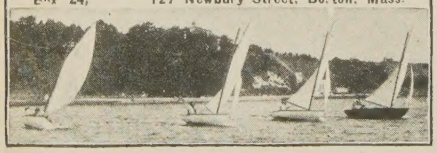

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Camp for Christian Girls 10-18. Winthrop, Me. Real camping in the Maine woods. Canoe trips and mountain climbing featured. Daily tennis instruction. Sketching. Exceptional swimming. Experienced counsilor for every three girls. Moderate fee. Booklet. **Marjorie S. Kirk, 320 Berkeley Drive, Syracuse, New York.**

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21st year. Mature counselors. Cabins. Elective daily program. Riding. Mountain, canoe and ocean trips. All sports.

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A Progressive Camp for Girls

On chain of 27 lakes. 14th season. All camp activities. French conversation. Many trips by canoe, horseback, truck, and motor boat. College graduate staff; doctor and nurse. Enroll early. Write:
Mrs. L. A. Bishop, Three Lakes, Wisconsin

While Russia is still on the bad books of the Diplomatic Service, it is becoming more and more gathering point for Americans of a better class who wish to know something besides what they read in the newspapers. It is fairly easy now to get into Russia, and safe to travel there. The Soviets are anxious, likewise, for the world to know what they are doing, so one can easily arrange to get a real view of Russian life. Irrespective of political philosophy, a program that extends over one-seventh of the earth's surface has sufficient interest to attract many citizens of the United States Moreover, a trip to Russia is indeed off the beaten path and decidedly "different."

* * *

For those planning at this time for the summer vacations. the Middle Western States, Wisconsin, Michigan and Minnesota, deserve consideration. This tier of commonwealths is the subject of another special number of Nature Magazine in May, and has recreational possibilities that are too little known. In the "Land of Hiawatha," the Upper Peninsula of Michigan, are a superb summer climate, fine fishing, great scenic beauty, and great wildernesses designed only for the sportsman and the out-of-doors lover. Minnesota, the land of 10,000 lakes, offers as much. One of the most marvellous trips in the world is a canoe trip over the old routes of the fur-traders to the Red River. The Wisconsin river and lake country is, in many spots, as untouched and primitive as the High Sierra, and utterly different. The Land of Sky Blue Water, as this section of the nation is called, will make up for winter's devitalizing effects.

* * *

With bookings daily being made for the American Nature Association trips to the West, the interest of Nature Magazine readers in these novel informal jaunts through the Parks is quite apparent, and the success of the idea is assured. In fact, it is recommended with all seriousness that those contemplating such trips in 1930 immediately make reservations, as the number that can go is definitely limited. The Inner Passage yacht trip is especially popular.

Nature Guide School

Announcement is made of the courses and plans for the 1930 summer session of the Nature Guide School under the leadership of Dr. William Gould (Cap'n Bill) Vinal to be held at Hudson, Ohio, this year. A bulletin descriptive of the courses and credits, and the general program and objects of the school has been published by Western Reserve University and can be obtained by all interested by writing that University at Cleveland, Ohio.

Mars Hill Camp

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Fifteenth Season

Provides constructive healthful activity for the growing girl and contemporary companionship of the right kind. Promotes an intelligent appreciation of the outdoor world, self-reliance and good sportsmanship.

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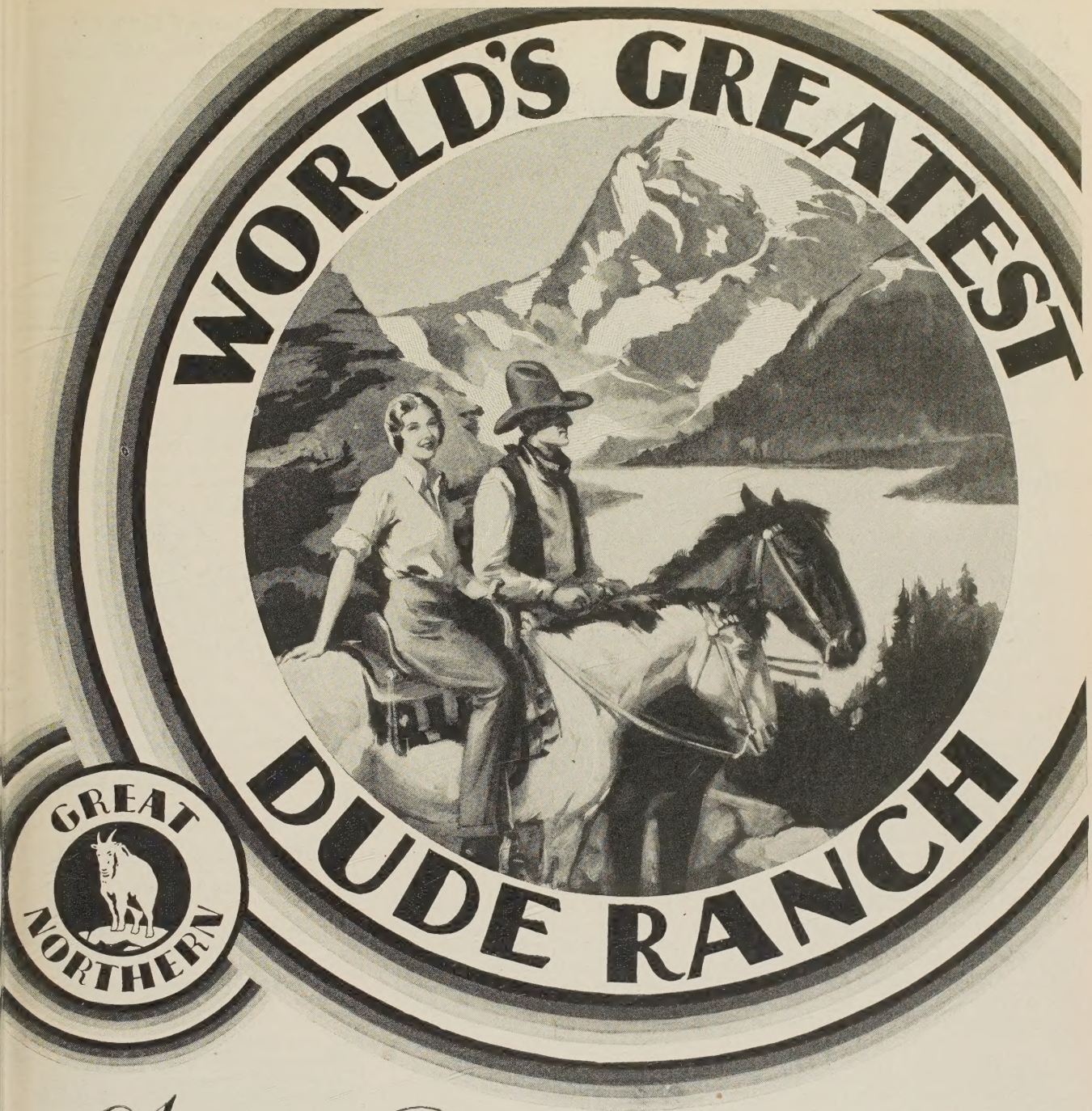
George K. Sanborn, Instructor at Phillips Academy, Andover, Mass.



Glacier Park via Great Northern

Come and ride in the world's greatest dude ranch . . . Glacier Park . . . where the trails go right up the sides of craggy mountains, up into the very clouds!

Start in the morning from the corral, out through the fragrant pines, along the shores of sky-mirroring lakes, then up, up, skirting a glacier that's seen ten thousand summers . . . with five hundred feet of scenery below your horse's hoofs . . .

And then come back in the cool of the evening, more than a little happy . . . to the geniality of a spacious hotel with all the comforts of a great city—a step from the primeval!

The Great Northern's crack trains—the new *Empire Builder*, the luxurious *Oriental Limited*, take you to the very gates of Glacier Park. All the information you'll want from your local Great Northern agent, or direct from travel headquarters in St. Paul, Minn.

The New
EMPIRE BUILDER

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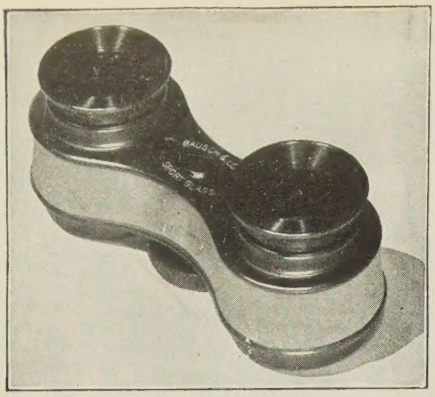

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A *REAL* microscope, powerful enough for grown-ups—at an extremely moderate price!

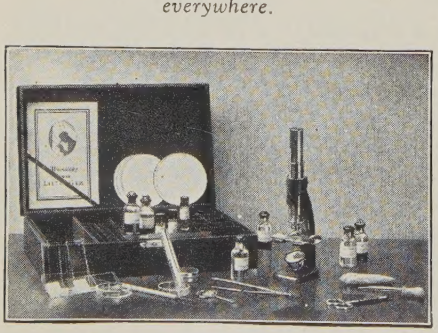
A genuine pair of field glasses, made and finished so finely that countless people carry them to the opera or use them in watching races and other sports!

These are gifts that thrill young peoples' hearts. And amateur nature students—no matter what their age—will find keen pleasure in these handsome Bausch & Lomb products.

The Bausch & Lomb Sport Glass is a pocket model that brings distant objects nearer. Easy to carry and use. Wonderfully steady. And it has a wide, brilliant field and surprising magnification.

The Little Gem microscope magnifies to 5625 areas. Remarkably powerful. Easy to use. Sturdy, accurate and well made throughout.

The Sport Glass comes in a variety of handsome finishes at $16.50 to $25.00. Gem Science Kit, complete, costs $27.50. Little Gem Microscope, only $17.00. Both obtainable at good shops everywhere.



The Little Gem Science Kit

BAUSCH & LOMB OPTICAL CO.

732 St. Paul Street, Rochester, N. Y.

So interesting are the pictures which Mr Hugh Spencer has made for the article on the spring peepers that we asked him to give us a little idea of how they were done. He complies by saying that "the photographs in this series were all made in the studio with exposures of from five to fifteen seconds. The little frogs will usually 'pose' in almost any position long enough to allow a full exposure. It is not so easy to persuade them to assume the exact position and facial expression desired. We begin with a small lump of modelling clay about the size of our frog and place it on the table or in whatever place we want our frog to sit. The camera is then carefully focussed and the shutter set and slide drawn. The next step is to get our real frog to replace the dummy.

"In handling the little frogs I have found it most convenient to use the handle of a penholder or tip of a blunt pencil. By slipping this under his throat and gently lifting him he can be persuaded to take hold of the pencil with his front feet and can then be lifted up and moved to the desired point in front of the lens. While carrying him about on the pencil it may be slowly revolved backward and this will keep him so occupied trying to keep right side up on top that he may not think of jumping off. After we get him in position it may still require some coaxing with the pencil to get just the right attitude and then, before he has time to make up his mind which way to jump we seize the bulb and make the exposure. Sometimes, of course, he will jump too soon and then we have to gather him up and go through the whole performance a second time. The camera used was a view camera with long bellows which permits of making the pictures actual size or even larger."

* * *

A new 16 mm. motion picture of reasonable price has been placed on the market and boasts several new features. It is known as the Pekoscope and is the product of Peko, Inc. According to the announcement it can be operated from an automobile battery in camp or wherever you wish, and packs up compactly for carrying about in one's equipment. It is listed at an F. O. B. price of $42.50 with a guarantee of one year.

* * *

We have had a number of inquiries asking us what kind of camera was used to obtain the mountain lion pictures which illustrated our leading article in February. These pictures were taken with a Bell and Howell Eyemo motion picture camera. Our expeditions are equipped with a catholic group of cameras—Graflex and Eastman for still work and several motion picture cameras so that there may be no delay for loading.

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For field studies in Zoology, Botany, Geology, Natural History of Birds, and Nature Study, under most favorable conditions as to natural surroundings, laboratories, living conditions, climate, and professional guidance.

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DR. ROBERT E. COKER, *Director*
CHAPEL HILL, N. C.

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AFFILIATED HOTELS

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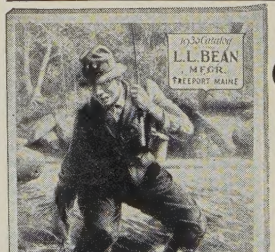

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Have a Camera In Your Vacation Outfit

The February issue of *The Ciné-Kodak News,* published by the Eastman Kodak Company, appears in new dress of most attractive typography and layout and with a different treatment of its editorial contents. This issue appoints all users of amateur movie cameras on its editorial staff and appeals to them to say what shall go into the publication each month.

* * *

Good suggestions for those doing any commercial photography and announcements of all sorts of things photographic are to be found each month in *The Rexo Bulletin,* published by Burke and James, Inc., 223 West Madison St., Chicago. Those photographically inclined should write for a copy.

Old Faithful

Members of the American Nature Association parties that visit the West this summer will see many wonderful sights, and those who are members of the Yellowstone trips will, of course, see Old Faithful in operation. The recent issue of Yellowstone *Nature Notes* says that many have viewed Old Faithful and have attempted to express their reactions in various terms. One tourist exclaimed, "Gee, it's just like a firehose." But, the *Notes* continue, "Occasionally the person who views the beauty, majesty, and grace of this column of water and steam which is projected night and day, winter and summer, at fairly regular intervals, is forced to write and attempt a description of the phenomenon. There recently came to our attention the best description we have seen yet after having witnessed over 500 eruptions. It was a letter in which this was written:

" 'I can't come to the Park next summer, but I shall think of the *most* lovely Old Faithful—rising with her eternal youth and infinite grace—oh, how I want to call her "Aphrodite". "Old Faithful" is too prosaic for such ever-youthful loveliness. I see her so many times rising in that wonderful grace, flinging her spray in perfect abandon, then gracefully lowering that regal crest, flinging her jeweled robes in a final gesture before the low bow—and exit! Never have I seen anything so lovely—so ethereal—and then to be called "Old Faithful". It's a travesty on beauty—that's sure.' "

To Elmer Reynolds

Few newspapers in the country can vie with the Stockton, California, *Record* with a record of championship of the National Parks and preservation of outdoor beauty. And it was the direction and vision of Elmer Reynolds that were reflected in the pages of his paper in this work. It is, therefore, a most happy movement that is on foot to establish to his memory at Silver Lake a Nature lore museum. The Elmer Reynolds Memorial Association has been formed and already contributions are coming in toward the total of $5,000 sought for this memorial. Mr. W. C. Neumiller, treasurer of San Joaquin County, whose address is Stockton, is treasurer of the Association.

H. ARMSTRONG ROBERTS

MR. Roberts, one of America's most famous art photographers, who has some 70,000 photographs to his credit, says:

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NATURE MAGAZINE

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To Stimulate Public Interest in Every Phase of Nature and the Out-of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

THE MAGAZINE

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THE YELLOWSTONE PARK BOUNDARY

An Editorial

VIGOROUS controversy has raged over Yellowstone National Park boundaries for eleven years. It still rages while a special Boundary Commission, sanctioned by Congress and appointed by the President, considers its decision. It is a complicated question. Directly involved are the state governments of Wyoming, Montana, and Idaho, the United States Forest and Park Services, game hunters, lumbermen, dude-ranchers and those who demand no cutting into Park boundaries. Indirectly involved are the United States Biological Survey, moose, elk, and other wild life, and policies of Park management.

Three things confront the Commission. First, should a fan-shaped area of three hundred and forty square miles be added to the southeast corner of the Park to include therein the headwaters of the Yellowstone River? Secondly, should the Snake River, on the south, be made the boundary and the notches south of it eliminated? Should Bechler Basin be cut from the southwest corner for reservoir purposes?

Yellowstone Park was set aside originally as a rectangle. Its boundaries were arbitrary, not natural. From an administrative point of view they are difficult. Last year the east and northwest boundaries were changed to create natural boundaries. The Snake River elimination and the addition of the southeastern area, known as the Thoroughfare Country, are in line with this program.

The Thoroughfare region is ruggedly beautiful, most of it eight thousand feet above sea level. Its timber is sparse and inaccessible. It is rich in moose and elk, marten and mink. Game Preserves of Wyoming fringe the East boundary of the Park, and the Teton Preserve the South. This region is, therefore, the last available hunting country adjoining the Park, and yields Wyoming revenue in licenses and its citizens profits from outfitting parties.

Lumbering, hunting and sanitary considerations complicate the Snake River plan. If the land in question is out of the Park, the Park Service no longer controls the southern bank of the river and is powerless to prevent the floating of logs. This change would open up considerable timber not now accessible, and river-driving operations might take place along a National Park boundary.

Elk summer in the Yellowstone highlands. They drift down to Jackson Hole in the fall, many crossing the notches which, if eliminated, will become public domain. Although they are now protected in the Park and the Teton Preserve, they could be shot by elk hunters on this public land unless the State of Wyoming should add it to the Teton sanctuary. The State may or may not do this of its own accord, and no bill affecting this area should be passed unless it provides that the tract remain under game regulations similar to those of the Park Service until made a preserve.

Typhoid broke out in Gardiner at the north entrance of the Park, a few years ago. Park visitors carried it as far east as St. Paul. The Montana government could not cope with its spread nor control the water supply. This example shows the need of the Park Service retaining control of Snake River. A typhoid epidemic may never come. It may strike next summer.

For eleven years the Bechler Basin has been sought as a reservoir site for Idaho irrigation projects. This is a beautiful stretch of meadow set in the southwest corner of the park. To the southwest is the Teton Basin outside the park, also a possible watersite, although admittedly more expensive to develop. So a strong Idaho element is seeking the elimination of Bechler Basin. The Department of the Interior, the Park Service and Congress have consistently opposed this change. Two issues are involved: are Bechler's beauties of National Park standard, and should a large area be taken from a National Park for agriculture when an alternative relief is possible?

Wyoming feels she has given enough. She gains no revenue from park exploitation; no taxes from 3,426 square miles of what might have been her territory. Elk molest her farmer's haystacks and tramp his fields in the Jackson Hole country. More and more of her range land is being bought up for elk winter feeding grounds, and turned over to the Government whence comes no taxes. She wants no further carving of her territory by the park.

Thus, in substance, is the Yellowstone Boundary problem. The American Nature Association urges careful thought upon it. The equities of the situation, it strongly feels, are with the people of the nation, instead of those of a state; are with the game, rather than with the hunters. They are with the park-lovers, not with the irrigationists. Precedents involving elimination of park land, unless the areas are definitely and conclusively proved not to be of park standards are dangerous. And a precedent involving, as in Bechler Basin, the carving of a park to relieve commercial enterprise that has not yet exhausted its remedies is most dangerous of all.

"... COMES THE CHEERLESS NOTE OF A PASSING RAVEN."

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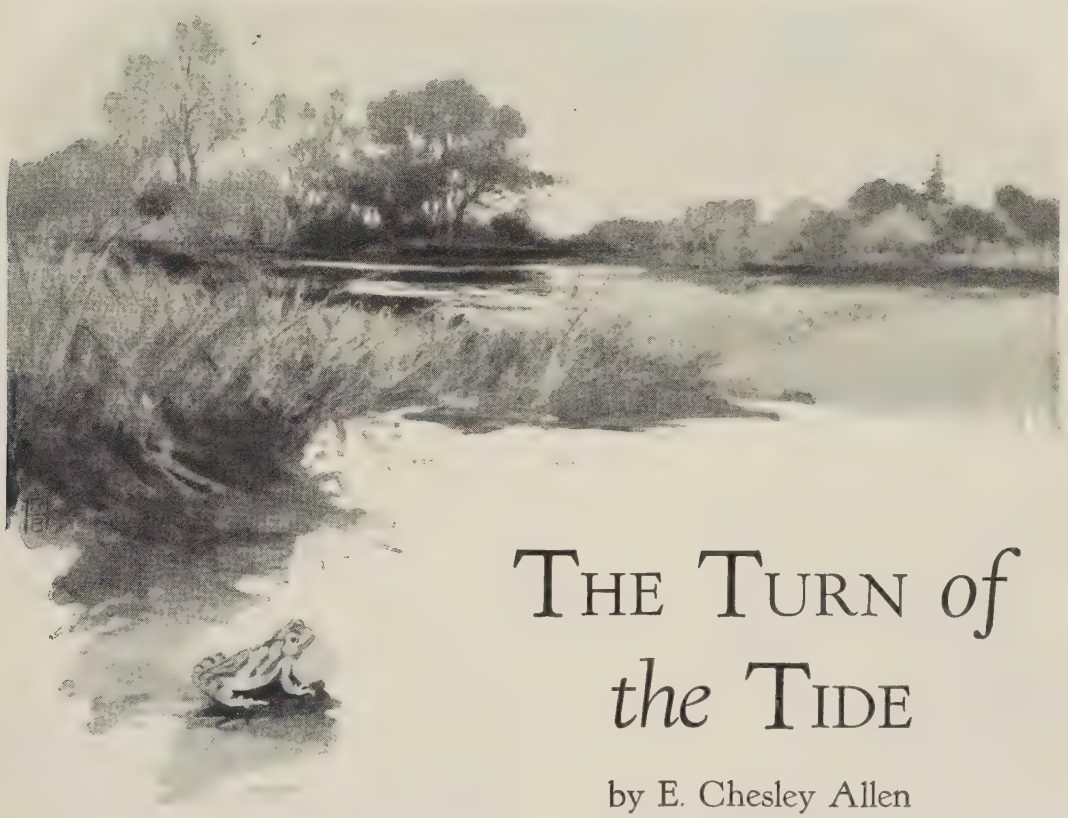


The Turn of the Tide

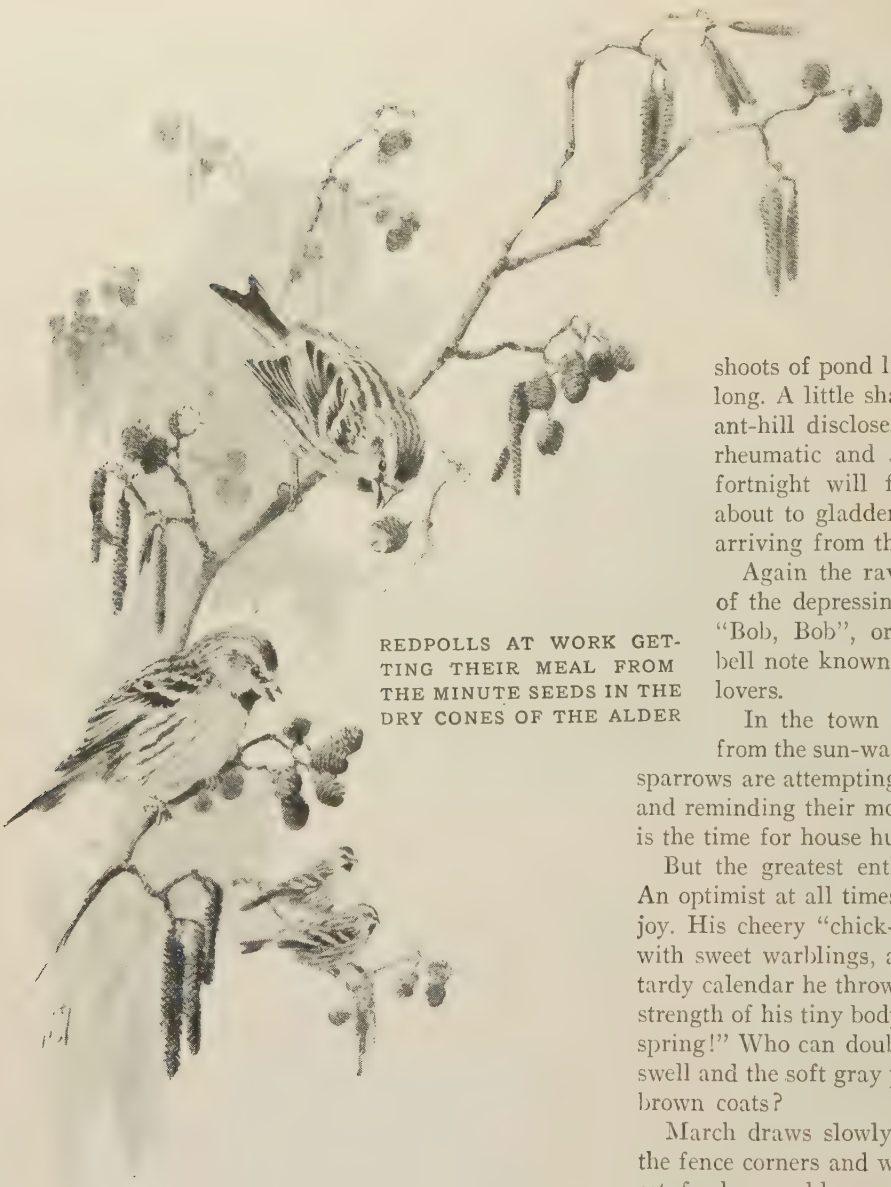
by E. Chesley Allen

Down in the southwestern end of Nova Scotia, nestling among the hills at the head of the Chebogue River, lies the little village of Arcadia. Here, twice daily, a small fragment of the mighty tide wave that flings itself against our iron coast must work its tortuous way through miles of sedgy salt marsh before it can hold belated tryst with the fresh waters of the little brook flowing out of the woods above the village.

So to our little province comes the Spring. The great tide of awakening life surging northward over a vast continent must pause here until the inimical forces of the north, with their flotillas of icy monsters off our shores, are defeated and dispelled.

Back in the nineties, in the little village of Arcadia in western Nova Scotia, the Allen family were chronically disturbed because the cows were not gotten in from pasture for milking time. There were two causes—their small son, intrusted with this task, and Nature. The song of a white-throat, the drumming of grouse or the whirring of a Wilson's snipe all submerged any cow-herding urge. But the boy grew up and we now welcome him to the pages of Nature Magazine for the first but not the last time. A teacher in grade schools, high schools and normal school, he has carried with him his love for the outdoors. For the past seven years Mr. Allen has been superintendent of the Halifax School for the Blind, but his Nature interest has found expression through radio talks under the provincial educational department and the written word. His is the happy faculty of writing charmingly about things eminently worth recording, and putting in print.

But now it is mid-February. The very sky itself is a cold, lifeless drab, shading down to a horizon of leaden blue-gray. It is the season of great silence in the north. A momentary breath of air rustles the dry, dead leaves still clinging to a beech, while from high up in the gray dome comes the cheerless note of a passing raven. Both seem but to accentuate the intensity of stillness. And with the stillness stalks her gaunt, silent sister, famine. To the small furred and feathered wood folk, the deep snow with heavy frozen crust is implacable in its concealment of seeds, frozen berries and the hoarded supplies of squirrel and wood-mouse. Here, the litter of wood chips scattered over the hard



REDPOLLS AT WORK GETTING THEIR MEAL FROM THE MINUTE SEEDS IN THE DRY CONES OF THE ALDER

white surface from a dead branch overhead shows how desperately a woodpecker has worked for his breakfast of tiny wood-boring grubs. There, a scattering of scales from hard, dry alder cones gives evidence of the work of redpolls or siskins in their search for minute seeds.

The tide of life is at its lowest ebb.

Then mid-March, and with it the promise. Slowly, almost imperceptibly, during the passing days, have come subtle changes. Little strips of bare earth, appearing at first around each isolated stump or granite rock, have slowly widened and merged until the snow has been driven back to its last stand in the shelter of the forest. The streams are running clear, and on the lakes the ice is black and spongy and treacherous. Along the edge of the clearing, beds of finely-cut aspidium ferns, still pressed flat by the winter's snow, show a cheerful green, and from the side of an old yellow birch trunk a gay little company of polypodies have relaxed from their winter's shrivelled curls, and are waving small green hands to bid all be of good cheer.

While yet there is no sign from the south, life is stirring with expectancy. On the surface of a quiet pool a band of whirligig beetles have come forth and are skating joyously about over its liquid face. Daring prophets indeed, for a few feet away they could skate on real ice. At the bottom of the pool, less bold, but hopeful still, a black-spotted leopard frog has emerged from the mud, and clings to the new shoots of pond lilies already three or four inches long. A little shallow digging into the top of an ant-hill discloses a company of its tenants still rheumatic and stiff-legged with chill. Another fortnight will find enough of them scurrying about to gladden the hearts of the flickers then arriving from the south.

Again the raven flies over; but now, instead of the depressing croak may be heard his clear "Bob, Bob", or a truly beautiful and mellow bell note known to very few of even our Nature lovers.

In the town the street pigeons are crooning from the sun-warmed roofs, and even the English sparrows are attempting all kinds of musical gurglings, and reminding their more sober-colored mates that now is the time for house hunting.

But the greatest enthusiast of all is the chickadee. An optimist at all times, he is now fairly bursting with joy. His cheery "chick-a-dee-dee" calls are punctuated with sweet warblings, and in his anxiety to hasten the tardy calendar he throws back his head and with all the strength of his tiny body whistles loud and clear, "Sweet spring!" Who can doubt that his call helps the buds to swell and the soft gray pussy-willows to burst their hard brown coats?

March draws slowly, so slowly, toward its close. In the fence corners and wherever the snow has lain heaviest, fresh emerald grass-blades appear. A warm rain has brought hundreds of worms to the surface. Why do the robins delay their coming?

In town gardens the crocuses are showing their long-stemmed wine-glasses of white, purple, and yellow; and the snowdrops are shaking out tiny green-tipped white bells.

Along the brook the speckled alder has loosened its tasselled catkins, and, at the slightest touch, clouds of yellow pollen float away on the mellowing air.

Across the clearing drifts a dark butterfly, probably a "mourning-cloak" or a "tortoise-shell". Most of our northern butterflies spend the winter in the less vulnerable state of egg or pupa; but these hardy species and a few of their relatives emerge from the chrysalis in the autumn and, seeking some sheltered nook, sleep away the winter ready to come forth on the first mild spring day and sip nectar from willow bloom or the sap oozing from some bruised maple twig. Late last fall, beneath the white birches, I picked up a loosely-rolled cylinder of fallen bark. Idly tipping it toward the light, I looked through its interior, and there, nestling within, were five "mourning-cloaks", prepared, with only this fragile shelter, to brave the hazards of frost and snow and myriad in-

sect enemies that prey upon it.

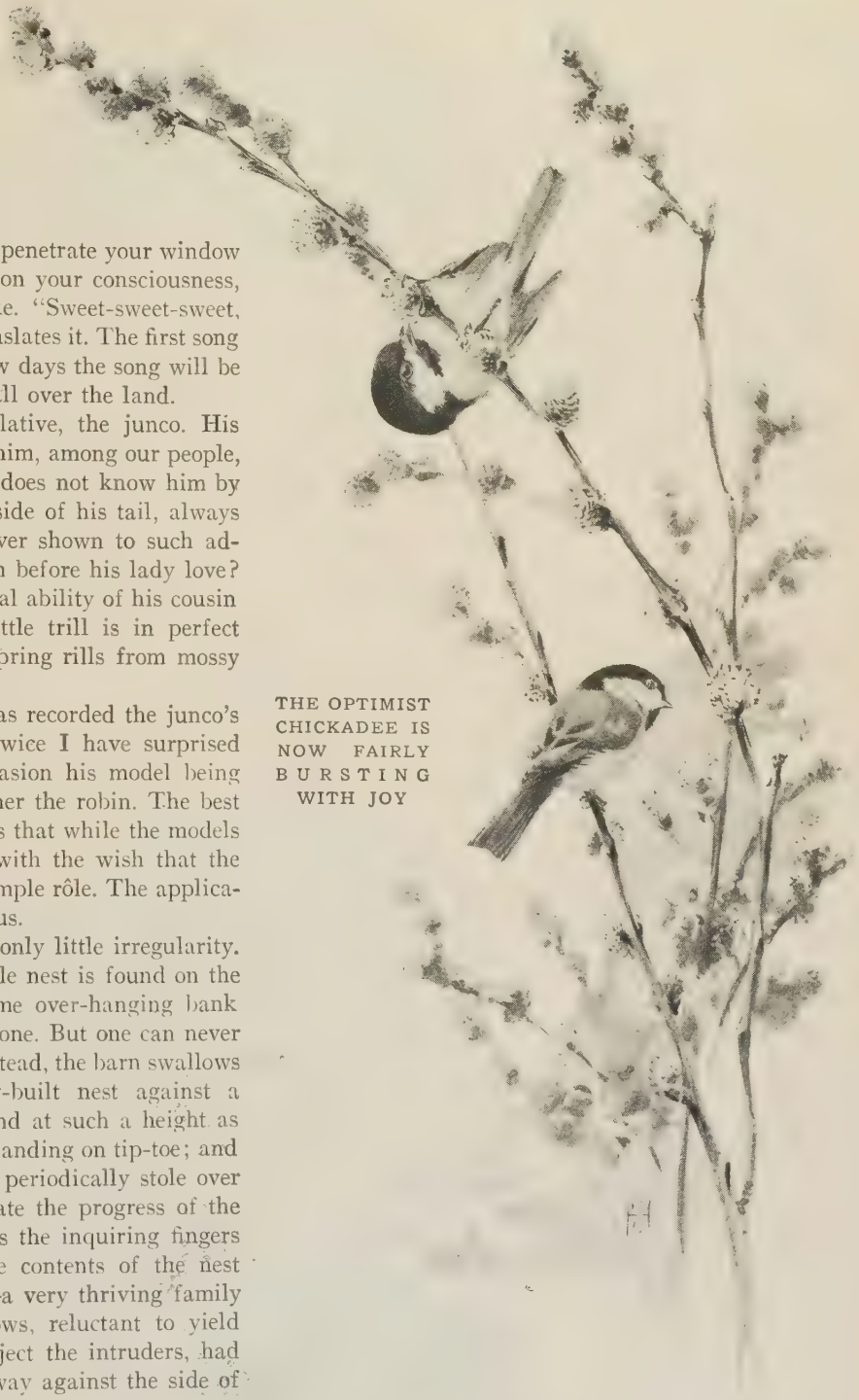
With such local preparation, surely the arrivals from the south are overdue. . . . Suddenly, one morning, the head of the procession appears. You are lying in that borderland between sleep and waking, just aware of the spring sun trying to penetrate your window shade, when a song breaks in upon your consciousness, and at once you are wide awake. "Sweet-sweet-sweet, very-merry-cheer", Van Dyke translates it. The first song sparrow has arrived, and in a few days the song will be heard from post, bush and tree all over the land.

With him comes his little relative, the junco. His modest blue-gray coat has given him, among our people, the name "gray-bird". But who does not know him by the pure white feathers in each side of his tail, always apparent when in flight, but never shown to such advantage as when he spreads them before his lady love? While he may not have the musical ability of his cousin the song sparrow, his simple little trill is in perfect harmony with the trickling of spring rills from mossy ledges.

I am not aware that anyone has recorded the junco's attempts at song mimicry, but twice I have surprised him in such efforts, on one occasion his model being the song sparrow, and on the other the robin. The best that could be said of his efforts is that while the models were recognizable one was left with the wish that the performer had kept to his own simple rôle. The application of the moral may be obvious.

Nor is plagiarism the junco's only little irregularity. Normally, his carefully-built little nest is found on the ground, in a cozy hollow of some over-hanging bank or beneath a projecting root or stone. But one can never be sure, for back on the old homestead, the barn swallows every year plastered their clay-built nest against a beam beneath an old building and at such a height as to bring it within reach only by standing on tip-toe; and every summer inquisitive fingers periodically stole over the side of that nest to investigate the progress of the swallow family. But one year, as the inquiring fingers appeared over the clay cup, the contents of the nest exploded in several directions,—a very thriving family of junco fledglings. The swallows, reluctant to yield up the locality, but unable to eject the intruders, had built a second nest a few feet away against the side of the same beam.

Standing apart in the old pasture was a little grove of spruces which evidently concealed a junco's nest. One of the parents, with full mouth, would disappear into its shadow and presently appear and clean its beak with the air of a domestic duty well done. A thorough search of the ground beneath the trees revealed nothing. Presently, from a place of concealment within the grove, a junco was seen to appear, and after a cautious survey of the surroundings, to hop upward from limb to limb into one of the thickest spruces and presently disappear into a dark mass at the end of a branch. Here, at last, was the solution of the mystery—a neat little nest of grass and horse hair nestling snugly within the coarse clay walls of a robin's nest.



THE OPTIMIST CHICKADEE IS NOW FAIRLY BURSTING WITH JOY

Late March brings a tidal wave of glorious melody. Thousands of fox sparrows, en route to their northern nesting grounds, arrive in full song, remain a few days and are off. Along the edges of the woods, where last year's leaves fill the little hollows, you will find them scratching industriously but taking time to pour forth a flood of warbling music. You will recognize them by their large size, for they are the largest of all our sparrows; by their heavily-blotched breasts, and by the deep foxy-red backs which give them their name. In three weeks at most they are away to the shores of Arctic seas and you will see them no more till autumn, when in silence and haste they are retreating southward before the advancing winter.

More noisy, though far less musical, is the black horde of grackles which arrives at this time. From lawn, field and orchard come their chatterings and squeakings. Immigrants from the west, they have penetrated into our province only in recent years, but in such numbers that their creaky voices, like the sound of unoiled hinges, are familiar field notes. Our true Nova Scotia blackbird, the rusty blackbird, is smaller and more retiring, but from the alder thickets and tamaracks along the rural water-courses his sweet voice may still be heard calling "Genevieve".

Best known and best loved of all the early arrivals is the robin; and although he is not the robin red-breast of English song and story, for his breast is not truly red, our pioneer forefathers, homesick for their rural deities, took him at once into their affections. And he, in turn, has confidently adopted the friendship of man and his cultivated areas. True thrush that he is, he sings best at evening; and, from roof or tall elm comes that song quoted by Burroughs from an unknown translation—

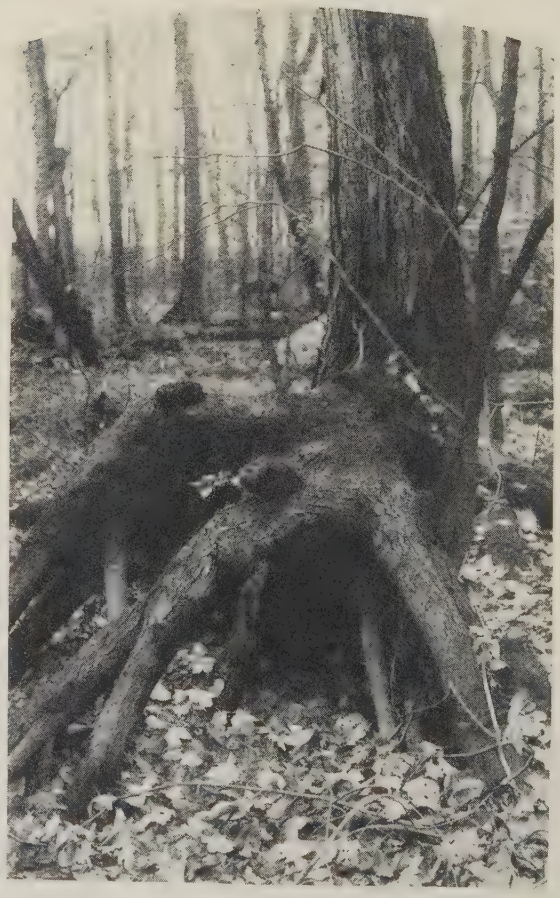
"Cheerily, cheer up! Cheer up!
Cheerily, cheerily, cheer up!"

The tide has truly turned. The first arrivals will soon be followed by the later sparrows; by the swallows and swifts; by the vireos, and the many-colored warblers. Already the big black and yellow bumble-bees are droning among the dead leaves, searching out the pink faces of the first mayflowers; and as the last level rays of the advancing sun light the northward faces of our houses, there rises from swamp and meadow the evening chorus of wood frogs and peeping hylas.

How Did It Happen?

What Caused Such Roots?

By Carl Krebs



AN UNSOLVED FOREST MYSTERY
How did this maple acquire such queer roots four feet above the surrounding ground?

Sometime in the life of this tree, which stands near Creston, Ohio, a catastrophe occurred. It is a soft maple, as the leaves on the forest ground testify, and as substantiated by the bit of foliage that still clung to the twigs on the 30th of October when this picture was taken.

The trunk of the tree grows some sixty feet straight up to the sky. About four feet from the ground a cluster of large roots issues forth from the bole. The bole is perfectly normal below these roots and measures two feet in diameter. A rough growth surrounds the juncture of the roots with the bole.

There are no creeks, rivers, or lakes nearby, so the agencies of turbulent waters could not have caused this phenomenal growth. At this place, however, the woods are somewhat on elevated ground and are composed largely of second growth timber. Perhaps winds partially uprooted this tree and it afterwards regained its hold and developed into a well formed specimen. Yet this explanation does not completely satisfy.

JUST SO BIG
Barely an inch is the measure of this lusty little singer of the Spring

HOW THEY POSE
In the Photographic Department the author tells how he got the pictures

Pipes of Pan

Singers of the Swamps and Meadows in April

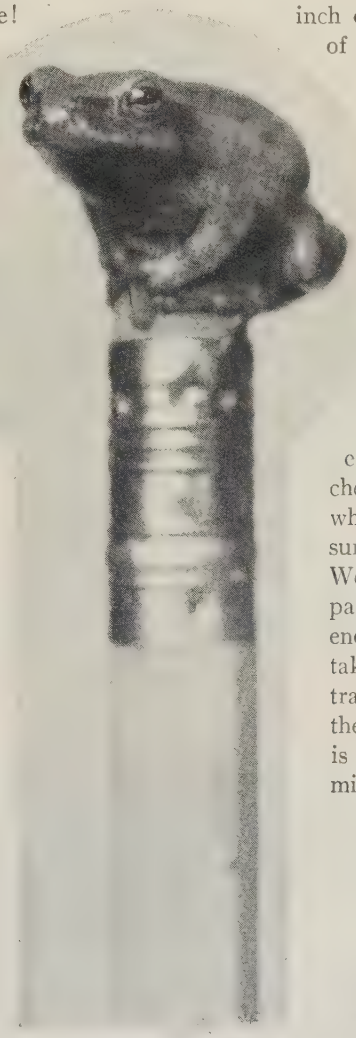
by Hugh Spencer

Photographs by the Author

Spring with its sounds of new life! Spring, with its odors of growth and newness! Spring, with the awakening of dormant Nature! Eagerly is it awaited and happily is it welcomed. And its coming, signalled by many voices, brings one song that is at once typical and yet, to the majority, mysterious. It is the lilt of the spring peeper, seeming to come from the water or from the very earth itself. Yet try to find this elusive singer. Even the keen-eyed small boy usually fails. But, though nowhere to be seen, these little fellows are plentiful enough if we may judge from the volume of sound they send forth in the April twilight.

Sometimes while walking in cool shady woods in summer you may see a small creature scamper across your path with three hops and a jump. He is not much larger than a grasshopper and if your eyes are not sharp you may mistake him for one. But look closely and quickly and you may discover a small frog an inch or less in length and about the color of a dead leaf. This is our piper of the spring meadows. He has forsaken the water to roam the forest floor or climb about in low bushes hunting for the small insects upon which he feeds. He has also left his voice behind him in the chilly spring waters; rarely do we hear him in the summer months. I use the term "he" advisedly for in frogland the males do all the talking; the females always maintain a dignified silence.

Come, take a walk with me some evening in April when the swamp orchestra is at its best. Now that we know what he looks like let us see if we can surprise him in his spring environment. We will take a flashlight and a covered pail, the latter in case we are fortunate enough to capture a few specimens to take home for closer observation. Let us trail along the edge of the marsh where the pipers are the noisiest. The sound is really terrific when you are in the midst of it and it is difficult to locate



A TINY FELLOW
The spring peeper is certainly a vest pocket edition of a froglet

the source of any of it. Then, suddenly, as they become aware of our presence there is a lull in the clamor, we hear the rustle of leaves in the undergrowth, and far overhead, the cries of some bird migrants passing on their swift northward flight. Soon there comes a shrill ye-e-e-p from a far corner of the marsh, then another and another, and in a minute they are hard at it again far and near. The sound seems to come from under our feet, over our heads, everywhere about us.

We take our stand near a small pool and play the flashlight about each clump of grass along the water's edge and are soon rewarded by the sight of one. The light does not seem to disturb him at all as he sits half in and half out of the icy water, tooting away upon his bagpipe with all his might. He may climb out of the water up some blade of grass or twig, still tooting a ballad to his mistress. We reach out a big hand and make a grab for him and all we get for our pains is a handful of wet grass and leaves. But patience has its reward and we soon go home with two of the little fellows to examine them closely and see what manner of instrument this is upon which they play their tune. Not the least disturbed by captivity they begin to sing in the pail before we get back to the house.

ACROBATICS
Sticky pads on its feet help

Young bullfrogs is what one native called them when we showed him our catch, and I have known many otherwise intelligent people who thought the same. But the bullfrog sometimes attains a length of eight inches, and *Hyla crucifer,* for that is our peeper's name, is the smallest of the tree frogs, scarcely an inch long! Observe his feet, which are provided with little sticky pads on the tip of each toe. By these he clings with ease to leaf or twig of small size.

We transfer our specimens to a glass globe provided with a bunch of damp moss at the bottom and a miniature ladder for the acrobats. There must also be a cover for the top. Now, if our hylas do not vanish underneath the moss they may crawl up the side of the globe and begin to squawk. One would suppose that in order to make so much noise the peeper would have to open his mouth, but such is not the case. Instead, he expands the membranes of his throat until it resembles a bubble half as large as his body and in some way by the expanding and contracting of this balloon he makes his music. His voice seems capable of a variety of tones, and sometimes he trills.

The little fellows appear quite contented in captivity, and though shy and wild at first they soon learn to be handled without fear and make most interesting pets.

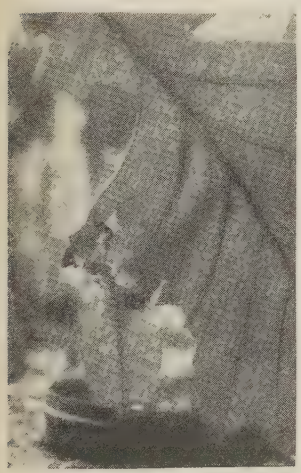
Hyla's food consists of small insects, and his manners when eating would be a shock to Mrs. Grundy, for he will leap across the table in any direction and catch his dinner in a wide open mouth. It is swallowed in a jiffy. If he happens to capture something not to his taste he will eject it with an expression of disgust and look about for something more appetizing. One can always get a thrill by introducing an active fly into Hyla's house and watching the sport that ensues. Mr. Frog may miss his quarry several times and bump his nose with terrific force against the walls or top of his house, but apparently without discomfort or ill effect. Sooner or later he will get his fly and will then sit quietly and rest with almost a smile of satisfaction on his face.

CONTRAST—BULLFROG CAST AND PEEPER
(Below) Out on a limb but being a tree frog he doesn't mind it in the least

SEE WHETHER YOU CAN FIND ME THIS SPRING
So elusive as to seem to many mysterious, the peeper is, nevertheless, a most audible little fellow

A word of caution to anyone who contemplates keeping frogs in captivity. All frogs are moisture-loving creatures and cannot live long without it. Keep a bit of damp moss in your frog jar, feed them a fly or two a day and they will thrive. In winter, when live insects are not available, they can be taught to eat meal worms or ant eggs, which may be procured from bird stores, or even bits of raw meat.

But the real place for these little fellows is in their swamp or meadow telling us in their own peculiar way that spring is here and that all is well. There we may observe their home life, and how the tiny tadpoles develop.



LEAVES *that* WALK

An Insect Ruse Which Works

by John J. Bichell

WALKING LEAVES ABOUT TO FOOL SOME ONE
Note that the female on the left carries her deception even to the point of having broken edges like old leaves. At the right, a pair show off on slender twigs

THE WALKING LEAF, an insect species the female in which has disguised herself to resemble vegetative life probably more cleverly than any other, comes originally from the island of Ceylon, but has been raised in Europe, whence eggs have been imported to America. When the young emerge from the eggs they are very active and a bright red in color. They do much walking about, but do not begin to eat until they are about one week old. A week later, they have begun to turn brown, and by the time a fortnight has passed, the females are green, which color they maintain until they perish. The older and larger they get,—and they grow to be four inches long—the more do they resemble a leaf. In their native country they feed on tea leaves and leaves of certain species of lemon trees, although I got good results in the United States with willow tree leaves and oak leaves. They are entirely vegetarian.

When about to lay their eggs, they snap their body with such force that the human eye cannot see the eggs shoot through the air to land in a spot where they remain from four to seven months before hatching. The insects molt six times, each time expanding so enormously that one wonders how they could have ever fitted the skins they shed. As they are but five-eighth inches when hatched, it is apparent that they grow considerably during their lifetime.

The males are more slender and smaller than the females, measure from 60 to 70 millimeters in length, and do not retain the leaflike appearance. They also have antennae almost as long as their entire body, and are able to fly several yards at a time. Some males are yellow and green, others green with a blue tint. They live only four or five weeks after maturity. The females are much larger, have short antennae and cannot fly. Their movements are sluggish, although they are very graceful when they soar down by use of their leaf-like bodies to where they want to go. Females are all of uniform green, and expel from eighty-five to one hundred eggs, and live from eight to nine weeks after maturity. They are about 100 millimeters in length, when fully grown, and it takes a sharp eye to discover their ruse for self-protection.

JOHN R. CONNON

BLOOMS OF THE RARE DOUBLE TRILLIUM

An exquisite beauty of the hardwood forests that is worth the search of the Nature lover

DOUBLE TRILLIUMS

by Jean Maitland

She was rambling through an Ontario hardwood forest, this lady who loves the wild flowers, when she spied a little, brown, shrivelled trillium bloom. She kneeled and found that, instead of the usual three petals, its outer row boasted six. Her trowel sunk into the ground, bringing forth the plant and around its roots enough leafy loam to make sure that the trip to her wild flower garden would be safe. In that garden, next spring, the trillium bloomed with twenty-four petals; four rows graduated in size with six petals to a row. Tender care and cultivation aided the plant until it achieved eleven blooms, the largest of forty-two petals.

This was the rare and exquisite double trillium that may be found, now and then, blooming in May or early June in the hardwood forest. It grows side by side with the normal specimens of the wake-robin, and it also resents being plucked. So short is its flower stem that picking means taking also the leaves the plant requires to manufacture food, thus a weakened and probably dying root is all that is left. And the reward is nothing but a quickly-wilting flower.

Friends of the lady who successfully brought a double trillium into her wild garden sought diligently for a similar prize, and found two more. One of them sent a bloom to Luther Burbank, who pointed out in an enthusiastic reply that this variation is one of the many freaks of the family. It lacks stigma, style and ovary. Stamens, also, are missing, and no seed is formed. The energy usually used to produce seed goes into the development of an abnormal number of petals. Mr. Burbank pointed out that the only means of propagating the plant lies in carefully separating the small bulbs while the trillium is dormant.

So the double trillium is one of those lures which will send Nature lovers abroad in search of the rare and elusive. The true Nature lover will leave the lovely plant where it is found, or will deftly and carefully transplant it to a wild flower garden and care for it.

Young Magnolia Warbler thinking about flight

Four youthful members of the Yellow-bellied Flycatcher family

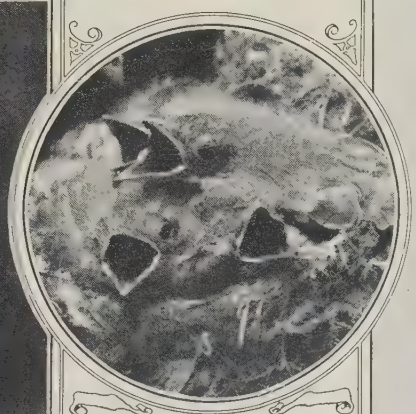
This baby Redstart is getting "air-minded"

When it's NESTING TIME in New England

A page of BIRD JUVENILES

Junior Robin looks rather disdainfully at the world

Olive-backed Thrush baby out of the nest for a pose



Hungry Phoebe babies, with Chickadee at left and Junco at right

SOME NOTABLES *of the Tree Choir*

What Is It that Makes the Music of Birds?

by Henry Oldys

TO DISTINGUISH the birds by their songs requires, not a musical, but merely an attentive, ear. One who has never hummed or whistled a tune can differentiate the various species of birds by their singing as well as he can a Plymouth Rock from a bantam by its crowing. The barnyard fowls are identified, not by the notes they utter, but by the character of voice and style of crowing. So with song-birds. Owing to the great individual diversity of songs one who neglects the quality, or *timbre,* of the voice and mode of rendering the song and depends solely on musical notations will be able to distinguish few birds. The fact that the songs of many birds are musical, and that such utterances as the barking of dogs and lowing of cows are unmusical, has no bearing on the matter. Noise and music are both sounds, and one sound is as easy to learn to recognize as another. Hence any unmusical person with a discriminating ear and an interest in the subject may hope to be able to make as quick and as correct identifications of birds from their songs as may a violin virtuoso.

Every species has distinctive vocal characteristics. One song sparrow may have as many as twenty different songs at his command, each as much his own exclusive property as though copyrighted. But all of these, as well as the songs of all other song sparrows, have certain qualities that proclaim that the singers belong to that species and no other. I have heard a song sparrow sing a song that was in form the exact counterpart of a chewink's. Yet there was no mistaking the fact that the bird was a song sparrow singing a chewink song. The only exception to this rule is the mockingbird, which renders the song of another bird in that bird's own voice. But the mockingbird changes rapidly from one imitation to another; and by the time several diverse songs and cries—perhaps cardinal, blue jay, guinea hen, whip-poor-will, and killdeer—have issued from the same spot it is not difficult to decide that they have also issued from the same throat.

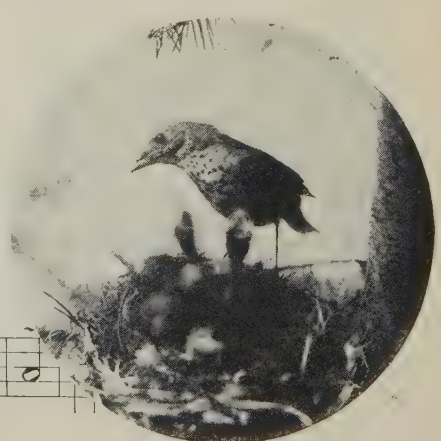
With this thought in mind, that each bird's singing is marked by a certain method and a particular quality of voice that indicate its species, and that these characteristics are as open to a non-musical person as to a musician, let us note the singing of a few of the more prominent members of the vernal choir and try to determine what these distinctive features are in each case.

Why is it that when we hear a robin song we recognize it as a robin's? (I am speaking now of ordinary songs, not those unusual ones that occasionally arise to perplex even an expert) I should say that the main distinguishing mark of the singing of a robin is its *eager insistence.* The bird will perch in the top of a tree in the open in full sight, often in full sunlight, and will pass from phrase to phrase so rapidly that each seems to tread on the heels of its immediate predecessor, while each is itself so quickly uttered as to be almost a jumble of notes. There may be only two or three phrases to the complete song, or there may be eight or ten, but there is always the same suggestion of impetuous speed. The different phrases are very short, loud, varied, clear-toned, and rippling, sounding as though whistled with

REMSEN BRINCKEROFF

BROWN THRASHER AND THE RUSSET-BACKED THRUSH

The thrasher is one of the first birds to withdraw his voice from the bird chorus. The russet-backed thrush is a western songster with a song that starts with a musical whistle in a low key, ascending until it ends in a spiral thread



WILLIAM L. FINLEY

FRANK BOND

FRANK BOND

RED-HEADED WOODPECKER AND THE ROBIN

His song, compared to that of other birds, is as a nebulous cloud to a constellation. The distinguishing mark of the robin's song is its eager insistence and its jumble of notes

play of the soft palate between notes. Meantime, in contrast to the hurried style of his utterance, the singer remains quietly posed in one spot as he repeats his song from time to time. As a rule these repetitions are varied. The different brief phrases which compose each song are apparently picked up and thrown together at random, after the fashion of a voluble talker with a disorderly mind. Here again there is a hit-or-miss eagerness about the performance that suggests breathless haste.

The Baltimore oriole sings briskly also, but as he dashes off his song, which is all in one phrase—generally a perfect little melody or tune—he seems vigorous only, not heedless. The robin seems to fear that if he does not hurry the world may lose something of value; the oriole utters his song in an off-hand way that seems to indicate indifference to his audience. He is much less formal, too, in his manner of delivery, often moving from point to point and perhaps snatching mouthfuls of food in the rather long intervals between songs. There is an incongruity between this bluff independence and the distinctly plaintive quality of his voice. His tones are round, full, mellow, smooth, and almost as loud as a robin's, but there is a querulous touch to them. It is this half-sad tone quality, coupled with energetic briskness of delivery, that more than anything else distinguishes the oriole's singing from that of other birds. Another distinguishing feature, which, however, is not always present, is a habit the bird has of prefacing his song with several widely-detached single notes, in which all the tone qualities just referred to are observable. The song, which is rather long, as bird songs go, is repeated over and over without change, a proceeding which is not so common as is popularly supposed.

The wood thrush is one of the great avian singers of the world. Not only does each wood thrush utter tuneful phrases, but its various melodies are so related to each other as to form a musical sequence, sometimes very rhythmical in character. They exhibit a relationship to each other similar to that in the lines of a song. In this respect the wood thrush outclasses all European birds that I have heard, excepting possibly the blackbird—which is a thrush—and the rock thrush. It is rivaled by several American birds. Naturally it is a matter of much interest to be acquainted with the song of a bird of such high rank. This is easy to attain, because the song is unmistakable. It is as quiet and leisurely as the robin's is strenuous and headlong. It is composed of short deliberate phrases of three or four notes each, separated by even-spaced, meditative pauses and delivered in clear, penetrating, tones that have the rich *tang* of a large silver bell, and with the palatal play previously referred to in constant use between notes. Each phrase is preceded by two or three quick light notes on a lower pitch—heard only when close to the singer—and followed by one to three rapid high metallic notes that resemble the swishing of a whip or the *tinging* sound given by a telegraph wire when hit by a small stone. These fore- and- after notes may be omitted on occasion, improving the song. Also the high after notes may be replaced by a deep heavy tone of very rich quality. Add to these points that the wood thrush, instead of launching his song into space like the robin, sounds his silver clarion in the heart of the woods, usually from a low perch, where he will remain for an hour or more at a time, and surely one should know this paragon of songsters on first hearing.

LYNWOOD M. CHACE

MOTHER WOODTHRUSH ON THE NEST

Perhaps the most popular of all the bird choir when it sings at evening

The brown thrasher is one of the first birds to withdraw his voice from the general chorus. His musical season ends before the first of

July. But he makes amends for his early absence by his assiduity while present. He is a model of earnestness and emphasis. Whatever he does he does with all his might. Should he undertake to break up some hard bit of food, he hammers it with all the energy of a woodpecker; when resenting intrusion upon his privacy, he hisses, utters loud smacks, or gives vent to a round, full, suddenly-muted whistle which makes a very rapid turn down and up again—a whistle that country school-boys are fond of imitating. When courting he prepares a clean-swept little parlor beneath a bush, entices therein a love-lorn female, and seeks to stun her into acceptance by lively gyrations and marvellous leaps, in which, cupping his wings, he comes down on the bare earth with a hollow sound that can be heard many yards away. When on his favorite song-perch, the very tip of a tall tree, he delivers his notes with a continuity and vigor that even a mockingbird can hardly equal. When he is singing he makes that the sole business before him and utters phrase after phrase with scarce pause enough between for breath and with the full power of his lungs, keeping up this stress and strain by the half-hour. He is sometimes mistaken for a mockingbird. Indeed, one of his names is "sandy mockingbird," but he is not the artist the true mockingbird is. His voice is much more limited in range and variety of tones, and when on rare occasions he imitates those short songs of other birds that form the entire substance of a mockingbird's song, he does so with little precision and without changing his heavy, throaty voice. The mockingbird's imitations are exact reproductions in every respect. Each of the brown thrasher's many phrases is short, quickly uttered, and may be repeated rapidly two or three times before it is dropped for another, thus—"Benedict, benedict, benedict," "Good-yeara, good-yeara," "Tē-bor, tē-bor" (evenly stressed), "Come here, come here, come here" (rapidly).

Although the brown thrasher does not aspire to showy colors, his rich light-brown coat, long bill and tail, and assured manner lend him an air of distinction. These various characteristics, together with his habit of seldom rising more than a few feet above the ground, except when gratifying his mood for music single him out.

The peculiar vociferations of the yellow-billed cuckoo have forced themselves upon the attention of our farmers, who hear in them prophecies of rain and have dubbed the bird the "rain-crow." The cuckoo sings every day throughout the summer, and since it sometimes rains in summer, I suppose he may be considered a true prophet, upon the principle of the "About-this-time-expect-much-rain", as says the old-fashioned "almanack." No less far from the truth, however, is the idea of those who imagine that the cuckoo clock can be depended on as an aid in identifying the American cuckoo. That time-piece reproduces exactly, though in miniature, the notes of the European cuckoo, but our two species of cuckoos sing in very different style. There is no semblance of music in the expressions of the yellow-billed cuckoo. One of these utterances is a series of evenly-spaced gulping notes, such as a human being would make vocally with the soft palate, somewhat like though harsher than the "glug-glug-glug" of water as it comes interruptedly from an inverted bottle. Another may be reproduced after a fashion by striking the round backs of two half cocoanut-shells together fifteen to twenty times, rapidly at first, then slower and slower to a very halting close. These are his usual "songs." Both are loud and come from behind the middle foliage of a tree where the author of the cacophony is concealed.

The red-headed woodpecker has as full an appreciation of the value of publicity as a politician. Wherever he may be he is in evidence. As he claps his gaudy colors to telegraph pole, dead tree, or fence-post; as he hammers loudly on the resounding wood; as he flies conspicuously across the open spaces; as he conveys his frequent and sonorous message to the public, he thrusts himself upon the attention like headlines, a bursting tire, or a circus poster. His song—if it may be called such—is a rapid, whirling, all-pervading repetition of a large, rolling, guttural note which seems to spread a thick, whirring canopy of diffuse sound overhead. In comparison with the song of another bird it is as a nebulous cloud to a constellation. It may be likened to a very throaty *k-r-r-r* repeated evenly, rapidly, and with heavy volume a dozen times.

The cardinal is red enough to please the most radical member of the Third Internationale; but he is a mild-mannered gentleman. A cardinal that comes regularly to my bird table, unlike song sparrow, brown thrasher, catbird, and junco, behaves like a Chesterfield. He is courteous and gentle toward the other frequenters of the table and often stops his own eating to place a morsel in the mouth of the mate or full-grown youngster that sometimes accompany him. He feeds without any of the greediness of such birds as English sparrows, starlings, and grackles. Moreover, he exhibits a dignified disregard of danger that few birds manifest. The cardinal's strong character appears in his song, which rings out from the tree-tops like a clarion call. It is a loud, clear, very full, liquid whistle of a robust soprano quality. Each of his varied songs is long and is made up of rapid and regular repetitions of a two or three-note phrase. These are unbroken repetitions, excepting that not infrequently a cardinal will first give the phrase a little more slowly and follow it with a brief pause, as though setting himself a copy or announcing his theme to the audience. Most of his phrases are rippling, with palate-play to a notable degree; but two conspicuous exceptions consist of long smooth notes which slide, the one up, the other down, a full octave. The first of these begins with a round whistle that gradually gets thinner as it gets higher, changing from an *oo* to an *ee* sound and cut off at the top with an abrupt *t*. The second, reversing this process, begins with an explosive *tee* and changes in the slurring descent of the scale to an *oo*, which fades out on the note from which the first phrase began its ascent. Frequently this vocal journey up and down the scale is made in one trip, by joining the two phrases together at the top. One of the many rippled phrases suggests very strongly the words "pretty girl," a compliment to his mate, actual or prospective, which the singer emphasizes by reiterating it ten or twelve times without a pause.

So, whether you are musical or not, turn an attentive ear to the bird songs which the springtime brings us. Learn them and find the joy that there is in associating the singer with his song.

SKEEZIX WAS INTRIGUED BY THE CAMERA

He was a good subject for the movie film but less easy to have pose for the still camera

SKEEZIX, a WHITE COYOTE

A Rare Member of His Tribe is Interviewed

by

William L. and Irene Finley

Illustrated from Photographs Taken by the Authors

He was white. That was what saved his life.

It all came to pass this way. Where the homesteaders come with their flocks and herds to the lands of eastern Oregon, there are coyotes. These wild dogs of the sand and sage find easy food among these domesticated beasts. So war has been declared and there is a bounty on their wily heads. One of them had been dispatched by a federal hunter and his den discovered. In it were four pups, cuddled in the enlarged badger burrow. Fate decreed that three should not grow to roam the rim rocks, but the fourth . . . Well, he was white. Not a true albino, to be sure, for his eyes were gray, not pink, but his coat contained none of the coloring matter that made him one with the land in which his fellows roved.

It was rather a small family that the hunter unearthed, for the coyote is a prolific breeder.

A female may have from one to fourteen pups; one case of the latter is on record in Portland, and several of thirteen. The average litter is six or seven. Larger than a fox, smaller than a gray wolf, the coyote is a distant relative of both, but his wits are perhaps sharper than his cousins' because he is born and bred in a wide open country where only the keenest can survive.

This snowy habit of the coyote pup brought fame to his nimble feet. Out of forty thousand of his tribe killed in Oregon during the past few years none boasted such a coat, said Stanley Jewett of the Biological Survey. He ventured, further, that Skeezix—for such became his name—was probably one in two hundred thousand, which, after all, is no small distinction.

Arriving at the Survey office in Portland, Skeezix made friends of those hired to take his scalp. He was interviewed by reporters. His pictures appeared in daily papers, and he rollicked about the office and rattled papers on the desk while camera men filmed him for moving picture audiences through the country. At odd moments he crept tremblingly to the edge of the low windows in the Post-office Building and looked down five stories where trucks rumbled and the wheels of loaded street cars crunched on steel rails. Proposals came from far and wide to adopt the orphan pup; other suggestions came to stuff his white hide with cotton and to set him up in some museum where moths might keep him company.

Skeezix was concerned more in getting away from strange noises, so he came to live in the country on our ten acres, and from the first he was treated like other pets—he was given the freedom of the place. Every object, however, was strange and had to be viewed with caution. He quickly recognized and came to those who fed him, yet fear, so deeply bred in his bones, showed at every turn. Being high-strung, a sudden noise or an unfamiliar object was likely to throw him into a panic. Try to approach him quickly and he would slink away: when we stood and waited he would approach cautiously and then assume a friendly attitude.

His reception by Peter, our little dog, made him feel more at home. Coming as a stranger, he ran fawningly up to Peter and made his first mistake. He nuzzled in Peter's side as if he had found his lost mother. In his younger days Peter would have taken such attention as a joke, and would have rollicked and rolled with the newcomer

SKEEZIX SURVEYS THE GENERAL SITUATION

When not otherwise engaged he stalks an imaginary enemy or occupies himself in a long and quiet watch at a mole hole waiting the occupant to emerge to its fate

on the lawn: not so at the age of thirteen years. Playful days have passed; his legs are rather stiffened with age. Peter's teeth have been smoothed on many bones, but Skeezix's were sharp and needle-like and when he took hold of Peter's leg, in one of his excited moments, friendship ceased. "Go your own way and play your own games", said Peter with a growl. But not even Peter expected an orphaned puppy to remember such advice unless often repeated.

PETER MEETS THE NEW ARRIVAL

He found the white youngster a bit too rough in his play, however

The backyard came to be Skeezix's playground. If he wandered from the door it was with extreme caution and he quickly returned. Every one of his five senses was keener than that of an ordinary pup. A piece of meat or a bone hidden was by no means lost; he knew where to find it again. His eye caught the movement of every swallow or robin that flew across the lawn; it followed every bat in the twilight. Every visitor that had a flapping trouser leg was welcomed. Skeezix learned quickly to follow and hang on to legs with a tenacious spirit. Skirts, too, would have been welcome if lower. How he loved to worry a rope or a gunnysack! Little he was concerned as long as he had plenty to eat, could doze in the sun, or occasionally sneak up behind Peter and pull his tail.

In the brief period of a month, Skeezix's fame had spread to the far corners of the country. Even national authorities were interested, especially since he had been a ward of the federal government. Because of his unusual color, orders came from the National Zoological Park, and at the Government's expense Skeezix rode across the continent as the guest of Uncle Sam. Perhaps he does not know what it is all about. He has been given aristocratic quarters among the notables in the National Zoo. Here he may be viewed by senators, diplomats and even the President. He will always have plenty of bones to gnaw, but no place to ripen them in the earth and few trouser legs to play with.

If Skeezix had survived in the desert, the possibilities were open for him to transmit his flaxen hue through his own race. Three thousand miles have separated him from this chance. He will never know the excitement of stalking long-eared rabbits, or of singing his coyote song to the moon from the brink of some wild rim-rock; nor will he develop the keen wolf wit to escape the warfare of long-ranged rifles, steel traps and strychnine. Perhaps it were happier for him to be dogged by state and federal hunters, and bay the moon, than to fret in the fenced confines of a zoo, puzzling about the mystery of his white coat. Who knows but he would rather take chances on a slow death under the desert sun, with foot gripped in steel, than to be penned where food is plentiful and his joints grow stiff with age. He may win himself a mate and sing the long drawn-out song of his race, but not on the far away high plateaus of eastern Oregon.

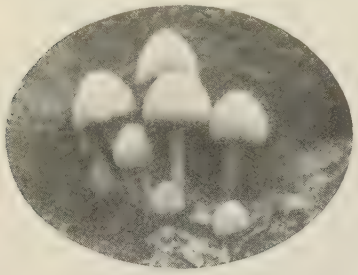
Instead of the rolling plains of purple sage he must view the flowing crowds of sauntering visitors of a sultry Sunday afternoon, and listen to their endless chatter.

INSECT STRENGTH In Comparison Man is Puny

When man surveys his donkey engines, his steam shovels, his dry docks, and his gigantic levers, he usually concludes that he is a powerful creature, but actually, his strength, supplemented by mechanical device, is not so much greater than that of many insects, and without his implements, he is but a puny weakling compared to them. In this photograph, Miss Cornelia Clarke shows a little black ant carrying home a cabbage butterfly, and getting along very well. Yet what man, single handed, could drag about his tin garage, or pull an elephant along the ground?

GLISTENING INK CAP

In May or June, these tender, tasty fellows crowd the shady lawns, or gather in the woods



INK

from White Mushrooms

They Furnish Food and Fluid

by G. G. Nearing

POSED FOR STUDY

You must pick glistening ink caps the first day, else they will melt and pass away

THEY FURNISH INK

But who would use the common variety thus, when they flavor steaks and stews so well?

AMONG the edible fungi, the ink caps securely hold third place in popular favor, with only the meadow mushroom and the puffball gaining precedence over them. And this despite their two unsavory habits,—the one of growing frequently on manure heaps, and the other of melting into an inky liquid almost before maturity. But once you have tasted a dish of ink caps, among the most digestible of mushrooms, you will understand their deserved place. For after only a few minutes' cooking, they acquire a most delightful flavor, and you can easily forget their queer traits.

Before going on search of these favorites, protect yourself and others by studying the group in a good handbook. With just a little application, you can learn their characteristics, and distinguish them from dangerous members who like them have the typical toadstool form.

Three common forms will provide you with bushels of ready food in May and June. The common ink cap, *Coprinus atramentarius,* grows grouped in barnyards, pastures, and in thin woods during rainy weather in late spring. You may also find it on your lawn. Specimens range from three or four inches to a foot in height. Similar is the shaggy-mane mushroom, but this carries on the cap fluffy threads which give it a conspicuously ragged and unkempt appearance, and it turns to ink the afternoon it first emerges unless the weather suddenly becomes dry.

Both of these kinds are whitish, changing later to a purplish-gray and black.

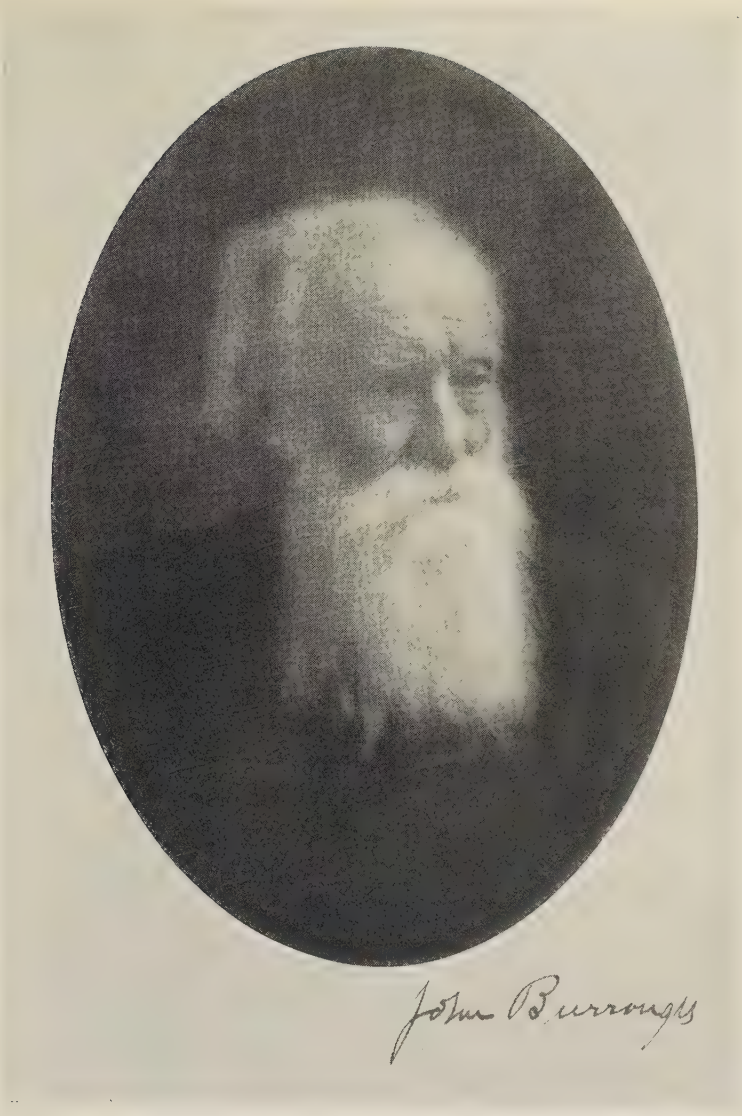
One mushroom enthusiast has actually made ink out of the black liquid which they exude shortly after maturity. The color is due to spores, microscopic seed particles which have a characteristic shade in each species of fungi. Some are white, others pink, ochre, brown, purple, and in one species green. Ink caps, however, all cling to black.

Most fungi shed their spores dry, to be blown about by the wind. Ink caps evidently prefer water transportation. Rill-faring folk!

A smaller and differently colored species is the glistening ink cap, *Coprinus micaceus,* which tends to buff or pale yellow, with tiny granules on the cap. It grows not on manure but on dead wood or dead roots just under the ground. You will find this little adventurer anywhere in woods or around shade trees on the lawn. It often springs up between paving stones or beside fences. Sometimes in May you will see vast numbers, and a great many appear in summer. Although it takes fifty or a hundred to fill a quart measure, they shoulder each other so thickly that one patch yields good quantity. You had better pick this one the day it appears, for although it lasts longer than the others without melting, still it becomes fluid rapidly. And how tasty and tender it is, when smothering a fragrant steak! So, armed with a good guide to the mushrooms, away to the lairs of these fascinating fungi to hunt them out.

MICHIGAN, WISCONSIN AND MINNESOTA NUMBER

The May issue will be the fourth geographical number of Nature Magazine and will be devoted to what may be described as the Upper Lake States. This issue will follow the general form of the previous special issues with specially-prepared articles on the wild life, outdoors and other Nature attractions of this section, written by those specially qualified in their respective fields.



A PICTURE OF JOHN BURROUGHS WITH HIS OWN SIGNATURE
(Loaned by the Author)

My Friend—John Burroughs

by Henry Litchfield West

Facsimiles of Letters Printed by Permission of Dr. Clara Barrus, Literary Executor of Mr. Burroughs

SOMEWHERE in what Hudson calls the far away and long ago, one of my ancestors must have been a gypsy or a wanderer. In no way else can I account for the fact that there was born in me a love of Nature and all outdoors. One of the greatest pleasures of my boyhood days was tramping through the woods. Once I travelled for many miles merely to find the head of a stream called Oxon Run. Many a time I have walked the fifteen or sixteen miles from Washington to the picturesque Great Falls of the Potomac, with a knapsack on my back, for the sheer pleasure of feeling the grit of the gravel beneath my feet, of brewing coffee and cooking supper upon a fire made with my own hands, and of sleeping under the stars. If I could find a congenial companion we went together. Otherwise I communed with Nature in an enjoyable solitude.

Into this boyhood life came John Burroughs—first through his books and then in a personal acquaintance which lasted until his death. When his first volumes came out, I purchased them out of my slender earnings and then, with youthful enthusiasm, I wrote to him to tell him of my outdoor experiences and how much his books meant to me. I still treasure his reply, written on a postal card with purple ink. It stimulated me to a greater love of the woods. "Keep up your outdoor life," he said, "for it will develop the iron in your blood." The fact that I followed his advice perhaps accounts for the fact that I am hale and hearty today when most men of

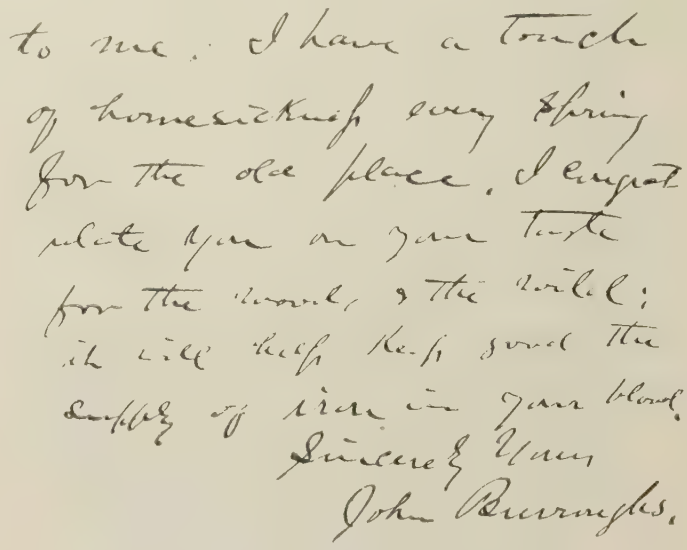
my age are on the shelf and ready for rest-cures.

It so happens that in the two admirable volumes in which Dr. Clara Barrus has compiled the life and letters of John Burroughs, my name is mentioned with three others who were Burroughs' constant companions in his walks around Washington. He was a man then and I was but a youngster. There was between us, however, a common love of Nature and a mutual and sympathetic understanding, even though I was a neophyte at Nature's shrine while he had been fully ordained. I marvelled always at the vast extent of his woodlore. He knew every bird by note, every flower by name. He needed no introduction to them. And I recall that upon one of these excursions we came out upon a hillside and looked down upon Rock Creek below us. The stream was muddy from recent rains.

"The creek has not washed its face this morning," remarked Burroughs, with a quaint humor that was delightful.

Our talk was not always of birds and flowers. We both loved Emerson and Thoreau and Ruskin; we both detested Browning; and we disagreed as to Walt Whitman, for never could I reach the height of exaggerated admiration with which Burroughs regarded the good gray poet. Mr. Burroughs would try to convert me by reciting some rugged and sonorous lines, but with the courage of youth I would reply that these quotations were like the Kimberley diamonds, precious when found but buried in a mass of otherwise worthless blue clay. Then Burroughs would smile and intimate that I lacked understanding. Perhaps if I had known Whitman as Burroughs did, my point of view would have been different.

It is an old story, perhaps, that Burroughs wrote his first book while an employe of the Treasury Department in Washington and that he filled page after page with glorious pictures of life out-of-doors while spending his days in a dark corridor as a guardian of a steel-doored vault. In those days the national capital was a straggling village, and Burroughs could drive a frisky cow down Pennsylvania Avenue without exciting a ripple of excitement. There were, however, some compensations. "From the hearth to the field," says Thoreau, "is a great distance." That was not the case when Burroughs and I went out into the woods together. It was but a step from built-up streets to woodland paths. Long ago our familiar and beloved tramping-places disappeared. Woods and valleys have been transformed —aye, have been devastated—by real estate developments. The nymph-haunted spots where grew the violets and the arbutus have gone forever.


to me. I have a touch
of homesickness every Spring
for the old place. I congratulate
you on your taste
for the woods & the wild;
it will help keep good the
supply of iron in your blood.
Sincerely Yours
John Burroughs.

"I have a touch of homesickness every spring for the old place. I congratulate you on your taste for the woods and the wild; it will keep good the supply of iron in your blood."

So wrote John Burroughs to his friend,—Henry Litchfield West,— who gives us here a charming story of the apostle of Nature. Mr. West, a newspaper man and a former Commissioner of the District of Columbia, has been the intimate of many men in public life, and is known and loved by many in turn. Yet it is John Burroughs whose memory he has most deeply cherished.

Serene I fold my hands and wait,
Nor care for wind nor tide nor sea;
No more I rave 'gainst time and fate,
For lo! my own shall come to me.

Nothing in all of Burroughs' writings is so characteristic of his temperament as these four lines which begin his poem, "Waiting"—a poem which he published with some misgiving because some friends to whom it was shown failed to be instantly impressed with its beauty.

I have never known a man who was so completely clothed with serenity as John Burroughs. He accepted the universe as he found it. Pomp and power failed to impress him and he gave to a President of the United States no more consideration than he accorded to the man who trimmed his grapevines. It is true that he admired Theodore Roosevelt, perhaps because the latter's tremendous energy was in diametric contrast to his own placidity. It will be remembered that Roosevelt invited Burroughs to accompany him on a trip to Yellowstone Park. Burroughs, who was always a reluctant traveller, accepted because he felt that the invitation was equivalent to a command. Just before the departure of the presidential train, I sat with Mr. Burroughs in his compartment and talked with him about the trip.

"I wish you were going with me," he remarked plaintively. "I do not know how I am going to get along with all the rest of the party."

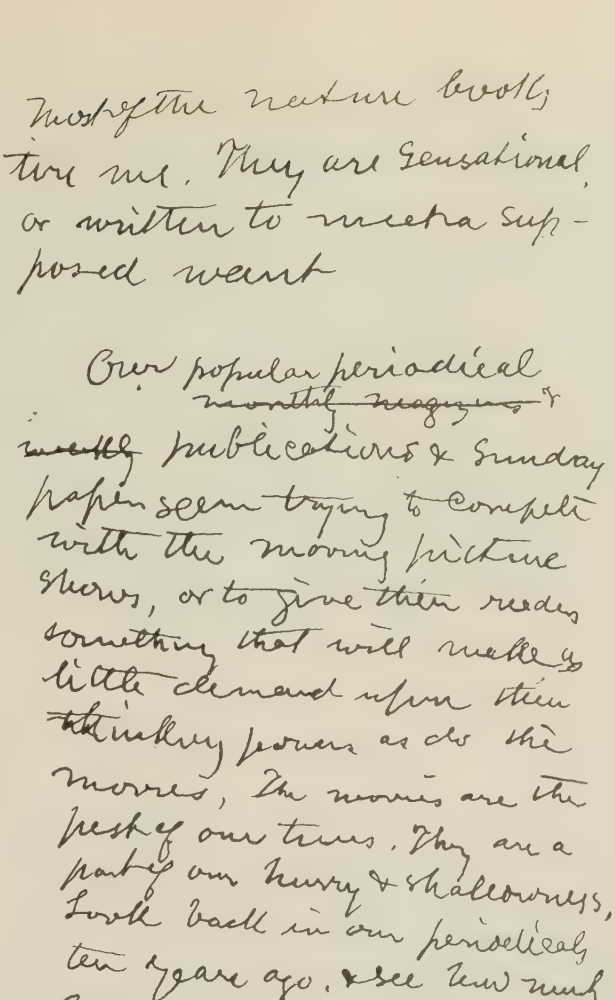
The quiet composure which was always a part of Mr. Burroughs' nature became more and more evident in his later life, when, as his writings indicate, his mind became more subjective and less objective. He still had a keen eye for every phase of Nature and still felt the thrill which followed the discovery of the first purple hepatica blossoming in the bare woods in early springtime, but he folded his hands and waited, gazing

with perfect faith and unclouded vision into the unknown. It was not with indifference that he peered into the future but he was willing to accept with supreme contentment whatever fate awaited him.

Perhaps John Burroughs' attitude on life and death are more deeply impressed upon my mind than anything else because these were the things we mostly talked about on the day I spent with him at Riverby, his home on the Hudson. These were the last hours I had with him before his death. We had been over to Slabsides, the quaint two-story cabin down in the woods, where Burroughs wrote his later books, and I had sat at the same table where President Roosevelt had eaten huckleberry pie. We went down to the cabin and returned in an automobile which Henry Ford had given Mr. Burroughs and which the latter drove with some trepidation because, as he remarked, a horse has some intelligence but an automobile has no brains. When we returned to Riverby we went out upon the hillside where we could watch the fleecy clouds overhead. As we looked down upon the river we talked of the darker river which Burroughs, though we knew it not, was so soon to cross. I could not help recalling the verse in The long famous *Rubaiyat of Omar Khayyam:*

So when the Angel of the darker Drink
At last shall find you by the river-brink,
And, offering his Cup, invite your Soul
Forth to your Lips to quaff—you shall not shrink.

There was no shrinking in John Burroughs' soul. He felt that his days had been long in the land; that his life had been happily spent in well-doing, and that he had instilled into the minds of thousands upon thousands the love of Nature which had been his own inspiration. We talked of Nature and Nature's God. In the philosophy of John Burroughs Nature and God were one. As he talked to me, with the blue sky overhead and our faces bathed in the balmy air of a newly-arrived spring, he proclaimed his disbelief in a man-made, personal God, bowing in reverence at the same time to the omniscient, omnipotent Power that created and guided the universe. Nor was he disposed to question the untoward manifestations of Nature as the work of an outraged Deity. Floods, famines, volcanic eruptions, even wars, were all accepted by him as part of a great program which tended in the direction of ultimate good. "Our earth came through great travail to become a habitation for men," he said, "and there will be many another spasm before perfection comes."



Most of the nature books tire me. They are sensational, or written to meet a supposed want.

Our popular periodical ~~monthly magazines~~ & ~~weekly~~ publications & Sunday papers seem trying to compete with the moving picture shows, or to give their readers something that will make as little demand upon their thinking powers as do the movies. The movies are the pest of our times. They are a part of our hurry & shallowness. Look back in our periodicals ten years ago, & see how much more solid matter there is in them than at present. The monthly magazine vies with the weekly for the ephemera of the hour, & the weekly vies with the daily paper—so little is there in any of them that a reflective man can sit by his own fireside & read.

Thus did John Burroughs write to Mr. West of tendencies as he saw and felt them not long before his death:

"Most of the Nature books tire me. They are sensational, or written to meet a supposed want. Our popular periodical publications and Sunday papers seem trying to compete with the moving picture shows, or to give their readers something that will make as little demand upon their thinking powers as do the movies. The movies are the pest of our times. They are a part of our hurry and shallowness. Look back in our periodicals ten years ago and see how much more solid matter there is in them than at present. The monthly magazine vies with the weekly for the ephemera of the hour and the weekly vies with the daily paper—so little is there in any of them that a reflective man can sit by his own fireside and read."

We discussed immortality. Mr. Burroughs frankly admitted his agnosticism—that is, he did not know. Whether or not human personality survives bodily death was to him an unsolved problem, nor did he trouble himself to seek an answer to the question. "I do not know," he said to me, "that I would really care to enter upon an endless existence. If death ends all, we can lie in our graves without lamenting our fate. If it does not, perhaps so much the better."

John Burroughs, though dead, yet liveth. In many places his birthday is commemorated this month, and in the hearts of millions there is undying love for the man who opened the book of Nature and taught us how to read its marvellous pages with intelligence and appreciation. Not mystical like Emerson, not rugged like Carlisle, not scornful of humanity like Thoreau, he made the world better by his sanity, his sympathy, his geniality, his love of human-kind.

Once I tramped with John Burroughs through a pine-forest, treading upon a carpet of needles, watching the fitful shadows thrown by the sunlight through the swaying branches overhead and breathing the perfume-laden air. As he lies at rest upon the bosom of his Mother Earth, I feel that I can say to him, as Andrew Lang wrote to Theocritus, "Nought hath thou found dearer in death than the fragrance of the pine."

SPIDER vs. SNAKE

In Which The Arthropod Wins

by E. Anderson

Our dining room porch was festooned with the webs of several large orb-weavers, *Epeira*, and feeding the spiders was a standard just-after-mealtime diversion. One August day we came out from dinner just in time to see a small green snake fall into one of the webs. It thrashed about wildly and with great tail-sweeps broke many of the main moorings. Every minute it seemed as though the snake would certainly break free. But the web was gummy and no sooner had he whipped himself nearly loose than he would entangle himself in the meshes again. At last he hung quietly, securely fastened about his middle, and with a few stray meshes holding his head and tail.

All this time the spider had been waiting at the edge of the web, making one or two sallies towards the snake and then darting back quickly. It now made a rush forward, seized the small section of the snake which was fast to the web, and rather ineffectually tried to spread out its winding sheet in the usual fashion. Picture the plight of the poor, unreasoning spider, accustomed to prey much smaller than herself, when suddenly confronted with a beast so entirely outside her experience. It was as though a butcher while dispatching lambs should suddenly have met with Siegfried's dragon and have been forced to fight it with the meat axe. The spider fought gamely but she was clearly up against a novel experience. After wasting great quantities of silk she had sheathed approximately an inch of the snake's long body in a tough silken case and had secured it with one or two guy-wires, sunk in her fangs for a trial bite, and ambled back to her home on the rafter.

THE DEATH THROES

The spider wrapped a little, then bit the snake, then ambled home to await results

For a minute the snake hung quietly as before; then with one great sweep it cleared its tail from the net and would have broken loose if the spider had not hurried down and repeated her performance of wrapping a short section with the greatest care and leaving the rest of the body unsecured. Then another bite and back she went to the rafter. From time to time the snake would writhe and twist until it was almost free, and the spider would repeat its wrapping act. The fight raged for three hours. By four o'clock the snake was sheathed for nearly its entire length in a tough silken shroud that swung perilously in the remnant of the original web. The spider was now noticeably running short of silk but her bites had begun to take effect and the snake made only an occasional quiver.

An hour later the snake was apparently dead and the spider had begun to hoist her prey above the web. At supper time we noticed her feeding on the victim. Next morning nothing was left but the shrivelled remains of this large feast.

BE THOROUGH
Direct the spray under, as well as on top of the plants

FOLLOW ORDERS
Faithfulness to directions is more than half the battle

Doctoring Plants

How To Fight the Battle of Your Garden

by C. T. Gregory
Purdue University Agricultural Extension Department

This is another of a series of articles by C. T. Gregory,—a recognized plant authority,—on Doctoring Plants. In subsequent issues, he will diagnose the diseases of iris, peonies and asters, giving direction for caring for them.

PLANTS cannot talk, neither can they move. They have no way of letting us know of their ills nor have they any way of avoiding them. As lovers of flowers and trees, it is our duty to protect them against the attacks of a vast army of disease germs and pests.

Unfortunately the needs of protection are many and varied. There is no single panacea to cure all ills. However, in every case the method of controlling any disease is based upon a careful study of the trouble and of the fungus, bacterium, insect, or condition that may be producing it. The specific remedies for various diseases of our plant friends will be given in subsequent articles, but first we must consider the medicine needed.

Most plant diseases are caused by fungi or bacteria which are also plants. Hence the question of disease control becomes a matter of killing one plant on another plant. The treatment must be so balanced that it will not hurt our friend but will kill the enemy. This means that the directions for control must be followed faithfully. Do not make the mistake that many growers have made in thinking that if a little is good, more will be better.

A second vital consideration is that fungous parasites are extremely tiny plants and are easily scattered by wind or water or are carried by insects. Being so small it is as easy for them to attack the lower surface of a leaf as it is the upper surface. This means that in dusting or spraying to kill the disease the job must be done thoroughly. Do not be content to merely wet the top of the leaves. Such measures are worse than useless. The plant lover thinks he has protected his friend when actually no good at all has been done.

So the first admonitions of the plant doctors are—be thorough but follow directions carefully.

The valuable medicines are not really so numerous. They may actually be boiled down to these: copper compounds, sulphur and its compounds, mercury compounds, formaldehyde and heat. For insects, these same materials may be used but the arsenic compounds like lead arsenate and calcium arsenate, and the nicotine preparations like nicotine sulphate, must be added. Scale insects are best killed with 1-10 lime sulphur spray or with a 3 per cent lubricating oil emulsion or one of the miscible oil sprays.

The oldest and best known spray material is Bordeaux mixture, a compound of hydrated lime, copper sulphate and water. The plant doctor usually speaks of this spray as 4-4-50 or 3-6-50 or some similar set of figures. These merely mean pounds of copper sulphate represented by the first figure, pounds of hydrated lime by the second figure, and gallons of water by the last figure.

The sulphur sprays are usually in the form of a mixture of lime and sulphur boiled together to produce the polysulphides of lime. These are dark orange-brown in color. In speaking of such sprays the doctor advises lime sulphur 1 to 10 or 1 to 50, meaning one gallon of

the concentrated lime sulphur in ten or fifty gallons of water. Most druggists do not care to handle this liquid because it may eat the container and leak out, producing an unpleasant odor. So there has been developed a form of dry lime sulphur which is about as effective as the liquid. It is easily dissolved in water and should be used at the rate of three pounds of the dry lime sulphur as equivalent to one gallon of the liquid preparation.

If the proper materials are used a dust is usually better than a spray. It much more readily covers the plant than does a liquid.

To replace Bordeaux spray there is a mixture known as copper-lime dust. This is actually Bordeaux without the water and when applied to a dewy plant will change to Bordeaux immediately. Most of the companies making spray materials will have this mixture. It can be added to the arsenical insecticides or with a nicotine compound if needed. Moreover, it is much superior to dry Bordeaux used as a dust.

APPLYING THE PROTECTING COAT

Dusts are more effective than sprays. They should be added when plants are wet with dew

Sulphur is commonly used as a dust for all sorts of diseases of flowers, shrubs and trees. The only precaution that need be added here is that nothing but the special dusting sulphur be used. Sulphur flour or flowers of sulphur are not fine enough for disease control. This dust is also mixed with various insecticidal compounds with complete success.

Formaldehyde is a gas dissolved in water at a forty per cent strength. It is one of our most valuable materials for seed and soil disinfection. It usually is used at the rate of one pint in twenty-five or thirty gallons of water. It can be purchased at any drug store. The seed is soaked in this solution anywhere from thirty minutes to an hour, depending on the resistance of the seed. For soil disinfection the space to be treated is spaded up thoroughly and well pulverized. The solution, 1 pint in 25 gallons, is then poured on the soil at the rate of one gallon per square foot. The gas is allowed to act in the soil for a week, then the soil is loosened again and allowed to stand at least another week before it is safe to plant.

The mercury compounds rate highest in their fungicidal value. Corrosive sublimate, known to the chemist as mercuric chloride, is particularly valuable. It is used at the rate of one part in one thousand parts of water (1-1000) or one ounce in 7½ gallons of water. Special tablets can be purchased at drug stores made up so that one tablet in a pint of water gives the required strength. This mercury compound is poisonous. It should not be mixed in any metal container.

Recently certain organic mercury compounds have been developed and are sold under various trade names. These are often quite effective in seed treatment but their particular value lies in the fact that they can be used on growing plants to check various root and stem rots without injury to the plants. The strengths of dilution are given on the container; they are usually one quarter of one per cent solutions.

These are the principal medicines. Now we must learn how to diagnose the cases, so as to select them.

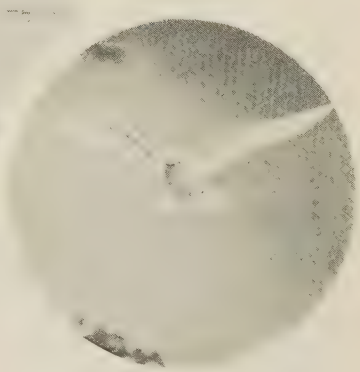
We have had ample proof in the past of the real interest of the readers of Nature Magazine in garden articles. In the past we have presented stories of various of our popular garden flowers, and will in the future. The present series by Mr. Gregory is designed to aid in protecting the flowers of your garden against their various enemies. Each month the excellent department by Romaine B. Ware will be found in the back of the magazine. It is designed to be of real practical assistance and is written by an expert. We would welcome any suggestions from our readers with respect to such garden features as we offer—and any criticisms. We want these features to be thoroughly serviceable.

"TAKING OFF" FROM LAYSAN'S BEACH

The albatross, with great scattering of sand, gains momentum for his flight

(Above) THE LONE HAU TREE IS PEOPLED

The usual booby tenants roost on this ancient ironwood former inhabitants planted



THE LOVE BIRD SAILS THE BLUE

The purest white, except for black eyes and leg-feathers. they are striking birds

DWELLERS *on the* REEFS

Birds of the Northwest Hawaiian Islands

by Lorin Tarr Gill

Photographs Courtesy Bernice P. Bishop Museum, Honolulu

ONE OF the most populous bird colonies in the world dwells on a drab, lonely chain of widely separated volcanic remnants, sand islands, reefs and shoals northwest of the main Hawaiian Islands. Huge rocks hung with precipitous cliffs, coral atolls surrounding lagoons, and bare reefs washed by the ceaseless tides,—these land prominences extend to the northern limit of the coral belt, some 1380 miles from Honolulu. With the exception of the station of the Commercial Pacific Cable Company at Midway, all the islands are known as the Hawaiian Bird Reservation and are under the jurisdiction of the Bureau of Biological Survey of our Department of Agriculture.

Birds hover over each in a veritable cloud. There are red-tailed tropic birds; man-of-war or frigate birds; albatrosses or goonies, boobies, petrels, shearwaters and terns; and, in addition to the large list of regular residents, there are thousands of others which visit the islands each winter,—the tattler, plover, curlew, turnstone, canvasback, shoveler and a dozen or more types of occasional or accidental wanderers.

It is Laysan Island which, today, harbors the greatest multitude of feathered creatures. This small sand ring in the midst of the Pacific is the regular home of at least twenty species, five of which, during recent years, were found nowhere else in the world.

Formed like a great oval platter, the island holds, dish-like, a shallow salt-water lake which varies in size with the amount of rainfall. The low sand rim slopes gently toward the sea without and the lake within, forming a double beach about three-quarters of a mile wide; and there a few varieties of hardy plants have established themselves, helping, with their roots, to hold the sand in place and adding to the ideality of the island as a home for the monstrous bird population.

Upon the arrival of the members of the expedition organized by the Biological Survey and the Bernice P. Bishop Museum of Honolulu, which visited the bird reservation aboard the naval mine-sweeper *Tanager* in 1923, Laysan's aspect was one of desolation, wind-swept and sand-piled. Two lonely and wind-bent coconut palms stood, sentinel-like, before a group of tumbledown shacks abandoned years before by guano workers; the island, which had been well-covered by vegetation,

DURING 1929, Kilauea, the famous volcano of the Hawaiian Islands, burst forth in two spectacular lava flows, and Dr. Jaggar, the earthquake expert, believes that these Pacific Islands may be due for several years of interesting subterranean change. A third lava flow in Kilauea is expected early in 1930, with the return of lava for an indefinite period. It will be interesting to follow coming events in the light of the several articles Nature Magazine has had on this volcanic group.

(Right) A FRIGATE BIRD ROOKERY

Most available space is taken. These birds are great robbers

OFTEN AN UNWILLING SACRIFICE

Young boobies like this one are endangered by predacious frigates

was nearly bare.

It was appallingly evident that rabbits, introduced in all innocence by the foreman of the workers in 1902, had increased until they had overrun the atoll, had denuded it, and then slowly starved. But a few hundred remained to face the same lingering fate, and, in the certainty that the chance transportation of a pair to other isolated spots would produce the same result, the lives of the survivors were sacrificed and Laysan was once more given the opportunity to clothe herself in green.

Yet, in spite of the depredations of the four-footed colony Laysan was literally alive with birds. The memory of thousands of flapping wings, the incessant screams from hundreds of lusty throats, and the all-pervading odor of guano will live forever in the minds of the visitors to the lonely shores.

Not only the air, but the one stunted hau tree, an ironwood planted by the former inhabitants, the scanty patches of shrubbery, and the earth for as far as six feet underground were all alive with birds. Almost every foot of land clear to the water's edge was occupied and the struggle, often for mere nest room, was intense.

Some of the petrels dig holes five or six feet deep and in them live hundreds of the night-flying type; another species makes holes but two or three feet beneath the surface of the sand, and above those are the burrows of the wedge-tailed shearwater. The surface of the ground is the most densely populated; dozens of birds live under the bushes, in the roots of the grass, and in the open spaces along the shores of the lake and seaslope, occupying their hard-won sites to the fullest capacity. Terns, boobies, and man-of-war birds preempt the choice top flats in the bushes, contending among themselves and their neighbors for desirable locations. Most of them are without fear and may be lifted from their nests like setting barnyard fowls.

The bulk of the population is composed of Laysan albatrosses, beautiful and white-breasted, with black wings. The black-footed type, with dark plumage and known as the sooty albatross or gooney, is also there in lesser numbers.

For four months the albatrosses roam over the ocean, but in October they begin to return to Laysan. All through the winter months and until the young are ready to leave with their parents the following spring, the island is covered with them. Looking in any direction one may see the old birds standing stolidly about, sitting on their selected hollows in the sand or engaged in the dance for which they are justly famous and which, in varying figures and maneuvers, continues all the time—the "albatross walk" or "gooney foxtrot." Wonderful in flight, they are clumsy afoot and lurch out of one's way like shambling old men ready to depart this life.

HERE IS A YOUNG TROPIC BIRD

Below is one step in the "albatross walk" or "gooney foxtrot". One can almost hear the long-drawn-out groan

The adults devote much time to the rearing of a single downy nestling which issues from a brownish-white egg about the size of a goose egg; it is so exactly like thousands of other albatross chicks that it is almost inconceivable that either parent, returning from fishing at night, can so readily distinguish it. Yet the old bird proceeds unerringly to its young and disgorges a mass of partially digested squid and oil; the young one inserts its bill crosswise in that of the adult and receives the offering with relish.

The nesting habits of the frigate birds have gained for them the most undesirable of reputations among their fellows. The male lures his mate to a chosen nesting-site by the display of his flame-colored throat enlargement, which, during the mating season, bears a close resemblance to a child's toy balloon. Then the building of the rude structure of sticks and vines is begun. The two steal from their kind in utter disregard of the ordinary rules governing the possession of building materials, and when both owners of a neighboring nest leave it at the same time, if only for a few moments, it is greedily carried off. Both parents sit on a single, large white egg, seldom leaving it for an instant day or night for fear it will be broken and the nest stolen. They are forced to keep even a closer watch over their single, naked chick.

FRIGATE BIRDS ON NECKER ISLAND

The male at the right has the characteristic seasonal throat enlargement which attracts the female

In securing their daily rations the frigate birds have acquired a skill which makes the acts of an ordinary highwayman seem commonplace. They establish their colony near a booby settlement and there they patrol the island and sea, lying in wait for their industrious neighbors or the shearwaters as they return from fishing expeditions. Often a flock of them attack a single victim until the harassed and fish-laden one lets go his catch piece by piece and, more often than not, after a hard day's work, arrives at his nest exhausted and with never a morsel for his hungry youngsters.

FATHER AND MOTHER BOOBY ON GUARD

Below is a quarter-grown gannet, a marvel of fluffy whiteness

During the calm days of summer when the sea is so smooth that the booby is unable to bring home its usual catch of flying-fish, the man-of-war bird not only resorts to cannibalism, but infanticide as well, seizing the unguarded young of its neighbor, carrying it high in the air and dropping it, and then swooping down to devour it at a single gulp.

The land birds on Laysan have suffered with the plants, yet remarkable among them are the types which, in their native state, were formerly peculiar to the island. In other years the shrubbery included in the less than two square miles of area gave protection to the tiny flightless rails, *Prozanula palmeri,* a reed-warbler, known as the miller bird, *Acrocephalus familiaris,* and two species of the Hawaiian Drepanididae—the Laysan finch or "canary", and the smaller Laysan honey-eater, *Himatione freethi.* The lagoon afforded harbor to a number of Laysan teal.

Upon the arrival of the members of the Tanager expedition, but a few dozen finches remained to delight the visitors with their songs; just three honey-eaters were seen and those, it is said, perished in a sand-storm; the miller bird had disappeared entirely, and two lonely rails were nesting in the thick stems of the bunch grass. Of the ducks, which have never been numerous of recent years, less than twenty disported themselves in the waters of the lagoon.

The depleted rail colony was later increased by the introduction of eight members from Midway where the peculiar birds have existed in great numbers since their introduction about thirty years ago; the finch, miller bird and honey-eater were all thriving at the cable station.

Though it is a common belief that the rails are wingless, in reality their wings have become so reduced in size as to be almost hidden in the body feathers and so weak as to be useless to raise them from the ground more than three or four inches; yet, outspread and flapping, they contribute greatly to running speed.

It is not known how the active little rail first came to Laysan as the species has no near relative with a wide-flying range; it is considered probable that its ancestors arrived long ago by accident, having, perhaps, been lost at sea during the season of migration. Finding Laysan small but well-stocked with food and without serious natural enemies, the birds doubtless settled down to live the island life and, having little use for wings, gradually lost the power of flight.

The "canary" is the best songster, having a peculiar

THE BLACK-FOOTED ALBATROSS

A portrait. Such was the bird the Ancient Mariner shot, and caused the terrible calm

ON NIHOA'S VOLCANIC CLIFFS

The white tern or "love bird" proves to be tame and tractable before the camera

note that lacks the warble of the domestic bird. The male is beautifully mottled in gray and white with greenish-yellow head and breast; the female lacks his color and is quiet. The peculiar egg-eating habits of the species insure them a long life on Laysan.

The honey-eater is the Laysan form of the apapani, which is common in the forests of the higher islands of the main group. In that it is small and red in color and has a long, slender curved bill and tube-like tongue with which it drinks the sweet fluid from the blossom of the portulaca, it clearly resembles its better-known relative.

Ornithologists have been most interested in the miller bird, so-called because of its fondness for certain types of moths found on the guano islands. It is a new, well-marked species and the only representative of its extensive family of insect-eating birds to be found in Hawaii. All of its relatives capable of making extended flights by sea are widely distributed in Australia and China and on the various Pacific islands. Brown, and only a few inches in length, it often breaks into a sweet melodious warble which, it seems, is all out of proportion to its size.

The sportsman finds it almost impossible to believe that a single species of duck should make so small an island its only home. A close relative of the Hawaiian duck, it is perfectly fearless; yet, as it is a poor flier, it remains within a few yards of the lagoon.

Some observers have said that the bird shows degeneracy due to inbreeding; its survival at all, in view of the ordinary hardships of its life, is a marvellous fact.

FEATHERED FISHERMEN OF HAWAII

They capture their prey by flying close to the ocean and swooping down on all unwary fish in the surface water

"ON WESTERN TRAILS"

No lover of Nature and the outdoors should fail, in making his or her vacation plans for 1930, at least to consider the Nature trips organized by the American Nature Association to Jasper Park and the Inner Passage of British Columbia, to Glacier National Park, the Yellowstone and the Southwest. These are presented as a service and not as a commercial enterprise and they offer something that can not be elsewhere duplicated. Send for a copy of "On Western Trails".

PRESENTING BLARINA

The Tiny Terror of the Woods

by A. Brooker Klugh

A CHARACTERISTIC POSE
Blarina sniffs the air, while his whiskers feel each breath of wind

BLARINA the Terrible! Who can and does capture and kill nearly twice his weight in mice! Who travels through the leaves and humus of the forest floor at the rate of a foot a minute! Who escapes the notice of many who believe they have knowledge of all the little folk of the woodland!

Blarina, whose full name is *Blarina brevicauda* is the short-tailed shrew common to the eastern North American forests. He is more active at night than during the day, and travels about beneath the dead leaf and moss carpet of the woods, rarely exposing himself for more than an instant.

He is about five inches in length, this little fellow, with a tail only an inch long. Dark brownish-gray above, his fine, glossy coat shades to a paler color on the under surface. Not much in the way of ears has he for they are not visible externally. His eyes are very small, and his snout is long and pointed.

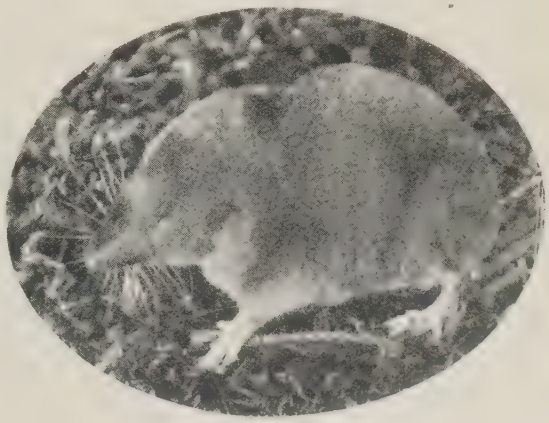
In the case of such an elusive little mammal as Blarina it is doubly difficult to determine how numerous is his kind. I know, however, that there are few pieces of woodland in which one cannot, by prolonged watching, catch a glimpse of him. Seton estimates that in a wood at Cos Cob, Connecticut, there were certainly fifty of these animals to the acre, and Shull, who has made a detailed study of the species, estimates that there are at least four of these animals to the acre throughout the range of the species.

The short-tailed shrew excavates burrows which are from an inch to an inch and a quarter in diameter, and which vary in length from five feet to several yards. The tunnels are usually tortuous, with several side-branches which often connect with one another, and some portions of the tunnel may be as deep as sixteen inches below the surface of the soil. The tunnels have two or more openings which go down at a steep angle for some six to eight inches. At some point along the tunnel is placed the nest, composed of grass, sedge, or leaves. Here hollow balls from four and a half to six inches in diameter, with walls half an inch to an inch and a quarter in thickness, are hollowed out. As shown by Shull, although the nest of the shrew resembles that of the meadow mouse, none of the coarser material of which the nest is composed is shredded by the shrew as is done by the other woodland creature.

Blarina burrows by strong outward and backward strokes of its front feet and forces its body through the soil like a wedge. It has been found that in loose soil a shrew had no difficulty in burrowing at the rate of a foot in a minute, and I have noticed that when burrowing beneath the mossy carpet in the woods they often progress at a rate of about a yard in fifteen seconds.

Comparatively little is known of the domestic affairs of the little animal. Merriam, Seton, and Shull all record finding a pair of this species together at various seasons of the year, so that there is a possibility that they mate for life. Two or three litters of from two to six young are produced in a season, and young have been found from late April until late September.

Both summer and winter are busy times for the shrew. In winter it not only burrows about beneath the snow,



AN ALERT LITTLE BURROWER
He travels underground at the rate of a foot in a second, if conditions are right

A. Brooker Klugh, M. A., Ph.D., who is now Assistant Professor of Biology, Queen's University, Canada, follows the career of Nature photographer only as an avocation. His main interest lies in plant and animal ecology,—the effect of physical factors of habitats on the forms of life therein. At present, he is devoting most of his attention to light's effects on living organisms. In his hobby, he has developed many new methods for under-water, insect and flower photography, and is Nature editor of American Photography. *He is a frequent contributor to Nature and other magazines.*

but makes long journeys over the surface, burrowing down whenever it comes to an elevation which indicates the presence of a log or stump, to feed, as is assumed by Merriam, on hibernating insects and pupae.

The creature's voice is, like that of all shrews and bats, high-pitched. Sometimes it utters a single shrill note, but more usually it emits a continuous twittering sound. A pair which came into my tent night after night at one of my campsites in northern Ontario kept up a continual twittering as musical as the notes of the American goldfinch.

Blarina is mainly carnivorous and insectivorous, although at times it eats vegetable food, including beechnuts. Its main diet probably consists of large numbers of insects which it takes in the adult, larval and pupal stages. Shull found that an individual of this species required fifteen adult May beetles or June bugs, as they are often called, as a day's rations. An individual which I kept for a time ate three large specimens of the two-striped locust in five minutes, and this same animal devoured six of these locusts, two crickets, a caterpillar, and forty-five smaller insects, in the course of a day. In capturing the large insects it always seized them by the head, which it crushed eagerly with a loud crunching sound.

ABOUT TO DISAPPEAR

Frightened, Blarina makes for home, displaying the tiny tail for which he is named

Mice stand as a close second to insects in the diet of the short-tailed shrew, the species most frequently captured being the meadow mouse, an animal nearly twice the size and weight of the shrew. In attacking it exhibits much ferocity, strength and persistence. Morden, who was one of the first to describe the habits of this species, says: "Four large meadow mice were procured and placed in the boiler with the mole-shrew, which as soon as it met a mouse showed fight. The mole-shrew did not seem to see very plainly and started round the boiler at a lively rate, reaching and scenting in all directions. The mice seemed terror-stricken, momentarily rising on their hind legs, looking for a place to escape, squeaking in their efforts to keep out of the way of the mole-shrew, which pursued them constantly. The shrew's method of attack was to seize the mouse in the region of the throat, which it did by turning its head as it sprang at the mouse. The mice would strike at it and usually knock it away with their front feet. The shrew at last attacked one mouse and stayed with it, and in about ten minutes had it killed and commenced eating the eyes and face."

Merriam found a short-tailed shrew weighing 11.2 grams could tire out and overcome a vigorous deer mouse weighing seventeen grams, the shrew taking half an hour to exhaust the mouse and another half hour to kill it. It does not seem likely that a shrew could catch the mice on open ground, but it undoubtedly captures them in their burrows. The fact that under natural conditions a considerable part of the diet of Blarina consists of these animals is shown by the finding of the bodies of two freshly-killed meadow mice and that of a third partly eaten, as well as several handfuls of hair in which were mixed tails and legs enough to account for about twenty more, at the nest of a shrew investigated by Shull.

The items of food which rank next to insects and mice in Blarina's diet are snails and earthworms, and the relative number of these eaten depends on the locality and the season. Shull found that in a tract of low land this species fed very largely on snails in winter, the main species eaten being the white-lipped land snail. The snails were gathered and hoarded in piles. They were moved to the surface, just outside the burrow, when the temperature fell, and back into the burrow when the temperature rose, thus being kept in the coldest place available, and therefore remaining in an immobile condition. Shull also found that though empty shells were sometimes brought to the surface, they were not taken down again, and his experiments indicated that the shrew distinguished between empty and inhabited shells by odor, or possibly by odor combined with weight. That weight alone was not the means of discrimination was shown by the fact that shells filled with soil until they weighed exactly the same as an inhabited shell were not taken into the burrows. Sometimes the shell was broken to get at the snail, but frequently the animal was dragged out without damaging the shell. About one hundred and twenty snails formed a month's rations.

In places where earthworms are abundant they undoubtedly constitute an important item in the menu of Blarina, and Shull discovered that when these alone were fed to a shrew it required thirty-five worms, about two inches long when contracted, to serve for a day.

The voracious fellow also eats other animal food, such as sowbugs, and Merriam mentions that it hoards and eats beechnuts, while Plummer says that a specimen which he had in captivity ate corn and other grain. Shull found that it would not touch vegetable material as long as animal food was available, and it is probable that under natural conditions vegetable food is very rarely taken.

Among the enemies of the short-tailed shrew are foxes, minks, weasels, hawks and owls, and snakes. The three mammals mentioned sometimes kill shrews, but apparently rarely eat them, probably because of their rank odor, and it seems that they are seized in mistake for a mouse. Four species of snakes are known to eat them, but only to a very limited extent. Hawks and owls are their chief enemies. Shull records that a shrew which he had in captivity for five weeks became entirely ob-

livious to sounds, even of considerable intensity, which were often repeated, with the exception of the flutter of the wings of a pigeon which was kept in the same place. This sound always sent it scurrying to its burrow, and though it must have heard it hundreds of times, it produced as great a disturbance of the shrew's equanimity at the end of the period as it did at the beginning.

The shrew's sense of sight is extremely poor, and serves merely to distinguish light from shadow, as is shown by experiments by Kennicott, Merriam, Shull and myself. Its senses of smell and hearing, however, are acute, and the former sense would seem to be the main one employed in locating food and the latter in escaping from its enemies. Likewise, it is very sensitive to touch, the "whiskers" especially being important organs. The lightest contact, even with a current of air, is responded to immediately.

When out foraging the short-tailed shrew runs about with its nose held rather high, investigates every nook and crevice, and smells over any object with which its whiskers come in contact. When out in the daytime it keeps as much as possible in the shade, and the intense light and heat cause it serious discomfort if it is exposed to full sunlight for any length of time.

Such a ferocious little beast might reasonably be expected to prove entirely untamable, but I found that an individual I possessed for some time, and handled a good deal, became markedly less savage and ready to bite in twenty-four hours, while Plummer kept one which soon became quite tame, taking food from his hand. It learned to come at call and never failed to respond, except when in its nest, and apparently very sound asleep, in the middle of a hot summer day. When running about it usually kept close to the wall, or under furniture, but it would come out into the middle of the room if called. This act of overcoming its natural aversion to open places shows how greatly its mode of behavior had been changed by good treatment.

A curious little fellow—this shrew. It would take years to learn all about him, but even a short study will serve to prove him interesting and unusual—the "terrible tyke" of the woodland floor.

CATS— *and* CATS

And the Breeds Stick Together

by A. B. Brooks

HER ADOPTED CHILDREN

These little woodland pussies got the same treatment as the brood Tabby bore herself

On an early summer day two boys and their dog, following a path through the woods, came to an old field overgrown with weeds and clumps of brush. Underneath a decaying oak stump a woodchuck had made its hole and Collie, in his round of inspection of all the woodchuck holes about there, finally came to this one, put his nose down deep into it, suddenly jerked it back, and then began to dig furiously. Within a few minutes out came a black-and-white skunk, dragged by the sharp teeth of the collie and, after a brief tussle, there was one less skunk and one wiser dog.

Presently the boys came up and, peering into the hole in which their dog had been digging, they saw four glossy little skunks; their eyes not yet open, squirming about in the nest which had been uncovered. Realizing that the young creatures would soon perish from starvation if left to themselves, the boys carefully placed them in a hat and carried them home. "Mercy on us," said the boys' mother when she took a look at what the hat contained; "What will you ever do with them?" That was a puzzling question until they thought of their gray cat and her family in the cellar house. "These are pole cats," said they, " and we'll put them in the nest with the kittens and make real cats out of them." And this is what they did.

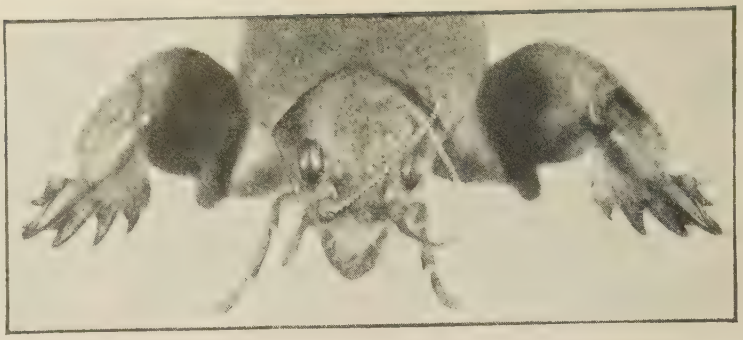
Then the boys watched to see what would happen when the mother cat returned from a hunting trip down at the barn. They were afraid she would disown the newcomers and would remove her own family to other quarters. But nothing of this kind happened at all. She may have been surprised when she looked in the nest but if so she said nothing about it, or showed no sign of it, and lay down purring in the scanty space left for her.

IT'S MEALTIME IN THE BARN

And the four orphans share as well as the four domestic infants, as may be seen

Now the eight youngsters, four of each, almost exactly of the same size, having no partiality shown to any one of them, are growing up, playing, sleeping, and feeding together, as any cat family should.

Perhaps it is this intense mother instinct that has carried the cat family throughout the earth in its history.



LOOKING A MOLE CRICKET IN THE EYE
Note the hand-like front legs, used for digging

HE'S AN INSECT WITH A MOLE'S HABITS
The farmer finds him destructive to field crops

An Underworld Character

The Mole Cricket is Especially Built for Destruction

by A. B. Champlain

of the Pennsylvania Department of Entomology

THERE are certain creatures of the underworld having no desire to attract attention, that invite comment in spite of themselves. Sometimes it is a lawless disposition on their part, again it may be a physical characteristic that makes them notorious, but not often does it happen to be a leg. In the case of the mole crickets, Gryllotalpa, whose history we are about to consider—they are especially notable on account of their peculiar and powerful fore-legs.

Mole crickets have lived underground so long that their leg structures have become greatly modified for the purpose of making tunnels like the mole. Although considerably smaller than that animal, these insects of the true cricket family, having a mole shaped body and fore-legs and mole-like habits, are appropriately named.

Making their homes in loose sandy places or in rather damp soil near streams or ponds, these insect diggers construct long underground chambers about the size of a lead pencil, throwing up little ridges as they proceed. It is to fit them for this method of progress that they have been provided with the shovel-like fore-legs that resemble somewhat the human hand. These sharp, strong claws are also made use of for cutting roots. In addition to this they have a thorax or chest that is strong and powerful for pushing through these galleries.

Some of these indefatigable burrowers construct galleries six to eight inches below the surface. It is during these activities that the roots of plants are injured. Though they feed generally upon tender roots, sometimes on potatoes or other field root-crops, it is said that they are partially carnivorous and will eat any soft-bodied insects that they come upon in their travels underground.

Sometimes they become destructive pests, and then these burrowers attract attention—especially when gardens are near to streams. When sufficiently numerous to be a menace to crops they may be destroyed by poisoned baits. Or if wet or damp soil is drained they will soon cease to bother.

These curious subterranean creatures sometimes attain a length of one and one-half inches, they are seal-brown or cinnamon brown in color and are covered with fine velvety hairs of the same shade. Mole crickets have six legs as do all insects, however the hinder four are not abnormally developed. With wing covers that are small in proportion to their bodies, we may find that the wings when unfolded are ample for a diplike flight. Although they are lovers of the dark, mole crickets are sometimes attracted to artificial lights and have been found at the arc-lights on city street corners.

Mole crickets are usually solitary except at mating time. The mother cricket deposits from 200 to 300 eggs in a round cavity or nest deep in the ground.

AT HOME IN LOOSE SANDY PLACES
Note the vigorous digging equipment

A SUBWAY ENGINEER OF PARTS
Underground living changed his structure

WHEN MOONLIGHT COMES TO MALIGNE LAKE, JASPER NATIONAL PARK

Most "moonlight" pictures are actually daylight pictures taken against the sun, but this is a real moonlight picture taken by Dr. Harold A. Bulger of St. Louis, a member of one of our 1929 parties. He used an Auto-Graflex to get this remarkable effect of this lovely lake on whose shores the 1930 parties will camp while in Jasper

WESTERN TRAILS

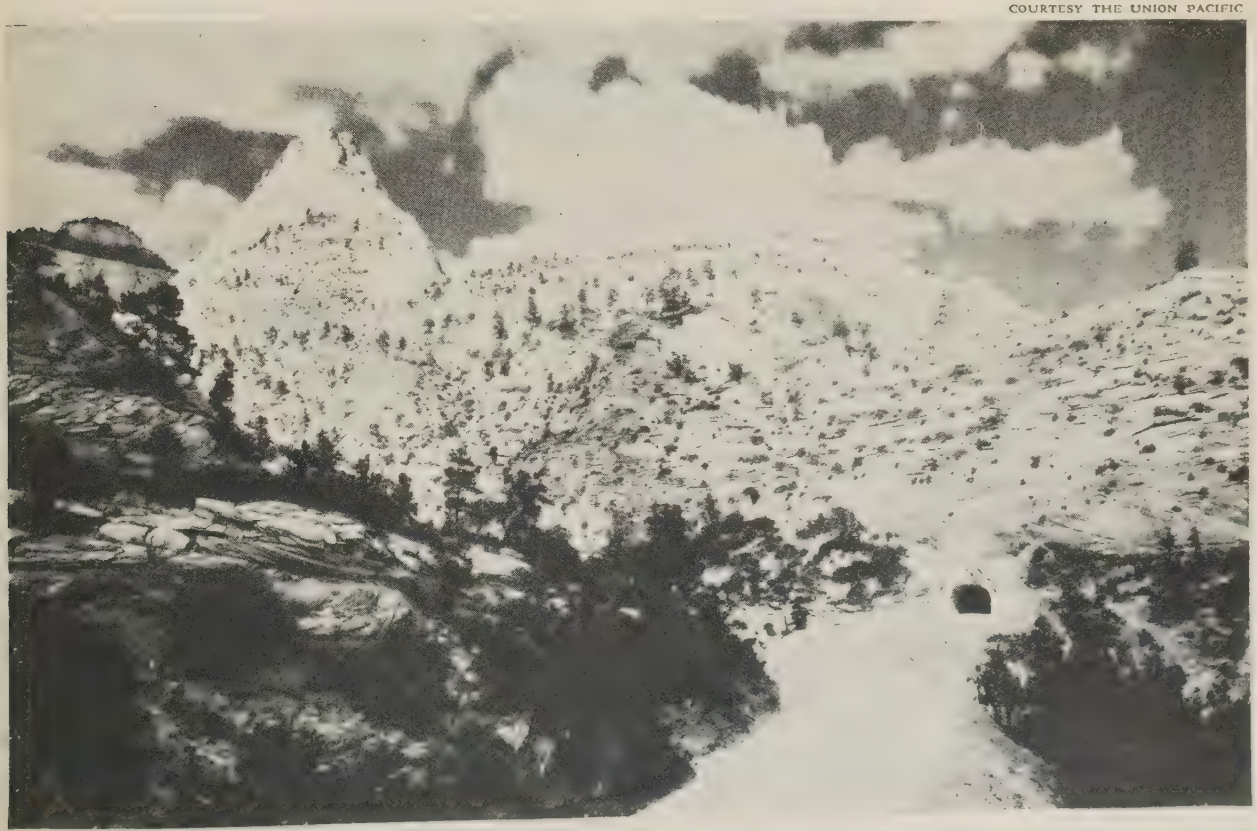
It is apparent, not only from the number of requests for the booklet, "On Western Trails", which describes the American Nature Association trips for 1930, but from the number of immediate reservations as well, that the Association is rendering a real service. Among the worthwhile people who make up the readers of Nature Magazine, there is a definite desire for summer vacations of a different and constructive character. Out of the experience gained on its various expeditions, the American Nature Association is happy to be able to meet this demand.

In selecting Jasper Park as one objective, those in charge of the trips were motivated by the newness, in point of accessibility, of this Canadian outdoor wonderland. Its richness in resources of Nature has as yet been unfolded to few, and both parties while in Jasper will be accompanied by a distinguished Canadian naturalist. The Inner Passage of British Columbia, several years

ONE OF MANY SPECTACULAR POINTS ON MOUNT CARMEL HIGHWAY

Those who know say that there is no more remarkable scenic highway in the world than the Mount Carmel Highway into Zion National Park. It will be opened for the first time this year and the American Nature Association party in the Southwest will travel over it both ways, in and out of Zion Park

COURTESY THE UNION PACIFIC



ARTHUR NEWTON PACK

IN THE ISLAND-FILLED WATERS OF THE INNER PASSAGE

For seven days the Nature Magazine parties will cruise on their two private yachts among the islands and along the wilderness shores of the British Columbia mainland. Here is truly a primeval country where mountains come down into the waters of the passage and untracked forests line the shore

ago the scene of an Association expedition, recommended itself also by its primitive and unexploited character. There man has made but little mark; there one can discover the feel of a primeval wilderness.

Glacier Park holds so many charms for the type of party which enrolls for the Nature Magazine trips, and was so unanimously loved by the 1929 groups, that it is again this year a focal point. Two of the parties will penetrate north into Glacier,

OLD FAITHFUL

There are those who rightly feel that a lifetime has not been complete without seeing this glorious geyser in the Yellowstone and others of the many wonders that abound in this park and that two parties will visit this year

following spectacular trails into that section rich in wild life.

To have been West and not to have visited the Yellowstone is unfortunate. The most visited of all the destinations of the 1930 parties, Yellowstone National Park holds, nevertheless, so tremendously much of distinctive natural history interest that both July and August parties were felt advisable. The isolation from crowds will not be as complete there as in the other places, but

IN GLACIER PARK

Looking down on the chalet at Granite Park, one of the places where the members of the Nature Magazine parties will stop, away from the usual tourist routes. Once on the trail in Glacier the parties are in the back country

that is testimony to the particular attraction of the Yellowstone.

The Southwest is full of charm and interest and logically the choice of the Association for one of its trips. Feeling that once there one should see as much as possible within the limits of time and ability to see thoroughly, the trip to the Southwest was planned to include the Indian Detour, the Grand Canyon, and Bryce and Zion Canyon National Parks.

Each one of the parties will be accompanied by a representative of our Washington office who will take care of all details, but there is nothing formal in any sense about these trips. A program choke-full of interest has been provided for each trip and is there for the members of the parties to take advantage of. If, however, one feels like varying the plan now and then that is one's privilege. Being limited in size, the Nature Magazine groups are more or less family parties out for a good time and to get really to know the country they are visiting. In outdoor clothes, a knapsack as only baggage, one feels the shackles of civilization, convention and formality completely left behind. A bit of a stubble on the chin or hair with no wave just adds to the joy of the open and of the trail. The trips of the Association are therefore quite different from usual tours.

All of these trips are described in detail in the booklet "On Western Trails". There will be found, also, a statement of the objectives of the American Nature Association in providing such non-commercial and specialized trips, for limited groups of people having a community of interest. The booklet sets forth very definitely the type of people who will be welcomed to such parties, —people who by nature and inclination are able to dedicate themselves to the fellowship of the trail, than which there are few more thoroughly happy fellowships.

WILLIAM L. FINLEY

A STOP ALONG THE INNER PASSAGE

The private yachts of the party are equipped with canoes and other shore-going facilities to permit the exploration of alluring bays and inlets and fishing for the salmon and other fishes for which this region is justly famous. Here is a stream of glacier waters tumbling down from the mountain side

COURTESY ATCHISON, TOPEKA & SANTE FÉ

THE FAMOUS INDIAN PUEBLOS AT TAOS

This will be one of the places visited by the Nature Association's Southwest party on its three days in the Indian country. Headquarters will be made in Santa Fé, from where trips will be made before the party moves on to the Grand Canyon and thence to Bryce and Zion Canyon National Parks

THE GOLD-BANDED LILY OF JAPAN

Have You Tried it in Your Garden?

by Edna Betts Trask

THERE is certainly no Nature lover who has not at some time longed to raise lilies. For many years, however, there has been a feeling among amateurs that the lilies are difficult to bring into bloom, and that they had best be left in the care of the professional gardener. This is a wrong impression. Lilies, like children, must be understood in order to be raised satisfactorily. They have their likes and dislikes, and their food must be selected with intelligence.

One of the hardiest and most gorgeous of the lilies is the one known as *Lilium auratum,* or commonly termed the gold-banded lily of Japan. Growing to a height of four and a half feet, this stately flower queen captures the eye of all visitors in the garden. With as many as eight open flowers and five to seven buds, it surely deserves the prize for quantity of bloom per stalk.

As to color, the name gives one a clue. On a white ground, covered with dark red specks, each wavy petal is painted with a broad, uneven line of soft yellow which follows the center rib. The ends of the petals curl around against the reverse side, starting quite near the tip. In this way it differs from the well known tiger lily whose petals start to curl backwards almost at the base.

This variety of lily needs no special care after once set. But a little preparation should be made at the time of planting. In the first place, the bulbs should be put in the ground as soon as they arrive from Japan. This time can not be depended upon as one year they may come in early, and the next year late. And if the bulbs seem very dry, soak them a little while in water.

Select a location in the garden where the sun will strike the plant for a few hours in the morning rather than the afternoon. This lily blooms in the summer, and as the afternoon sun is a little too hot for the delicate buds, the effect is likely to be disastrous.

After selecting the location, dig down to a depth of a foot, and lay in material for drainage. One of the reasons for failures among beginning gardeners is disregard for proper drainage. Fine gravel and sand make good drainage material, as do broken flower pots. Lilies, like many shade-loving plants, do not enjoy having their feet stand in water. And the only way to be sure that you will not make your lilies suffer such treatment is to make these arrangements before planting.

A little powdered sulphur sprinkled on the base of the bulb will tend to ward off rot or mildew, a precaution worth taking before planting. Now the bulb is ready to be set in the ground. For this particular variety of lily, allow eight inches of soil to cover. The reason for this deep planting is that roots develop at the base and stem of the bulb, unlike the manner of development in many kinds of lilies.

It is always advisable to have plenty of leaf-mold in the soil which is used to cover the bulb. Lilies enjoy an acid soil, and the leaf-mold assists in keeping this acidity. Do not use lime or manure with lilies; they do not take kindly to it. A little bone-meal is a safer fertilizer to use.

If you have never tried to grow *Lilium auratum,* do so this fall. They are the loveliest of the bulbous flowers, and with proper winter treatment, should come up every year, as strong and vigorous as when first set out. Their delicate fragrance is something never to be forgotten, and their mammoth flowers and opening buds serve as excellent decorative material.

AMONG THE BEAUTIFUL LILIES
The gold-banded variety has a touch of the Orient in its dark red specks and soft yellows

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Restoration of color illustrations to the pages of Nature Magazine will soon be accomplished. If it is possible to complete the preparation and printing of the first set for the June number they will appear in that issue. R. Bruce Horsfall is now at work exclusively in the production of originals in color to meet the strenuous public demand.

RAINBOWS *on Wings*

The Massena Trogons of the Tropics

by Alfred O. Gross

WHERE NATURE'S COLORS WENT

The Massena trogon, one of the most brilliant birds of the tropics

TO THOSE who know the tropics, other places on the face of the globe grow drab and flat in comparison. It is a rainbow land, with its thousand bright shades flashing kaleidoscopically from every side, with its myriad forms of bird and animal life, with its tangles of verdure choking out everything but lush-growing life. The birds, untold numbers of them, are perhaps more responsible than any other factor for the brilliance which sends lovers of the tropics back again and again. And among them, the little trogon accounts for much more than its share of lavish display. It is a veritable rainbow on wings.

Of the many gorgeous trogons indigenous to our own American tropics, the most striking, and incidentally, the most common in Central America, is the massena trogon, *Curucujus m. massena*. It is a handsome creature about twelve inches in length marked with brilliant metallic green above and with bronzed green on the throat which changes abruptly to a gaudy geranium red on the breast and underparts. In striking contrast to these colors, the wing coverts are gray with fine markings of black and white. Even the bill of this bird, which the natives of Costa Rica call the "mountain parrot", is highly colored with salmon orange. These colors which are so striking and conspicuous fade into insignificance, however, when seen against the variegated lighting of a tropical background. Under such conditions the trogons are as difficult to see as the protectively colored goatsuckers such as *Nyctidromus*, the jungle whip-poor-will, which lives in the same environment.

The massena trogon is a passive creature never meddling in the affairs of other birds of the jungle but attends strictly to its own business. Most of the trogons I have seen in Nature were noticed by mere accident while searching the dense foliage for other creatures. One day when walking on one of the trails of Barro Colorado Island, Panama Canal Zone, where the massena trogon is common, I came upon a male bird perched on a limb overhanging the trail not more than fifteen feet above the ground. Though aware of my presence he allowed me to view his beautiful plumage from every angle, yet following me closely with his eye as I circled around him.

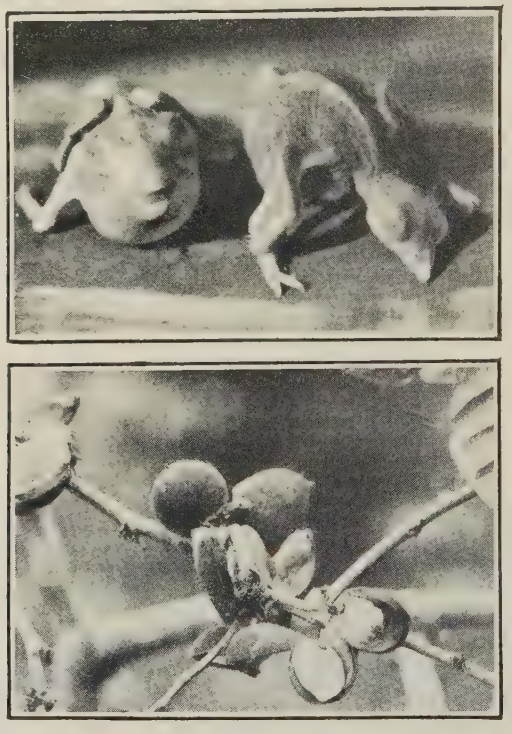
Though the trogons are extraordinary in their possession of brilliant colors they have but little musical talent. The notes of the massena trogon are little more than a monotonous commonplace "Kaw, Kaw, Kaw", varied at times by a series of subdued whistled notes. The calls are more frequently heard during the early morning hours and are in less evidence as the light and heat of the tropical sun become more intense towards midday. It is also during the hours immediately following dawn that they are most active in their feeding operations. One of the most beautiful scenes of tropical bird life that I have ever seen was during an early morning in October when seven massena trogons and five graceful trogons, *Trogonurus curucui tenellus*, were dexterously balancing or suspending them-

THE life of Alfred O. Gross, now Professor of Biology and Ornithology at Bowdoin College, has been filled with conservation struggles and ornithological investigations in many parts of the world. With a degree from Illinois, he had worked as field ornithologist for the Illinois State Ornithological Survey and gone to Bermuda on a tropical bird study before obtaining further instruction at Harvard and the coveted Ph. D. In 1924, he was field bird-man for the Roosevelt Wild Life Experiment Station. The five-year heath hen investigation, which recently terminated with the sad announcement that but one of the species remained, was conducted under his leadership, as was the important New England ruffed grouse investigation. During the past summer, he was engaged in directing activities of the Wisconsin prairie chicken survey. The past few years have found him at Barro Colorado Island, Canal Zone, in Costa Rica for the United Fruit Company, in the lowlands of Ecuador and on the Andean plateau. And yet with all this travel and study, he still finds time to write articles of a popular nature.

selves with half spread wings from long-drooping vines hanging down from the limbs of a giant sand box tree. The sun was filtering through the jungle roof and beautifully illuminated the whole scene in such a way that the magnificent colors of the birds, the tropical foliage and the brilliant red fruits were shown up at their very best. Sometimes there was keen competition for a certain branch laden with an abundance of fruit, which usually resulted in a friendly tussle involving a vigorous flapping of wings that dislodged many fruits and sent them raining on the foliage below. Some of the birds flew frequently to the less accessible fruit clusters and without alighting poised on their wings to pick out the black seeds contained in the white interior of the opened fruits. After securing a beak full of the pulpy material they would generally fly to the nearest tree to feed in peace, but as soon as the seeds were eaten they were back at the vines for more. The food of all trogons examined consisted chiefly of fruits, berries, seeds and a few insects. Many of the latter were probably taken incidentally at the time the birds were eating fruits.

One might expect a beautiful bird such as the massena trogon to select a nesting site in an attractive environment, but contrary to such expectations we found the nest of this bird in a most unusual situation. Throughout the tropics there are a great many different kinds of insects of which the termites, the so-called white-ants, build large dark-colored nests of wood pulp and soil. The nests vary in size from a few inches to several feet in diameter, and are usually attached to large vines or constructed on or about trees. A deserted termite's nest of considerable size located around a group of small trees at a distance of twelve feet from the ground was selected by a pair of massena trogons as a nesting site. Whether the birds excavated their own nest cavity or not I was unable to determine as the eggs were already in place when the nest was found on June 28, 1927, near the Barro Colorado Island Laboratory. The entrance tunnel to the nest took an upward course of several inches, then turned abruptly down into a chamber approximately eight inches in diameter. No nesting material had been added, clearly indicating that these birds primarily nest in excavations of some sort. The two eggs were a very light bluish white without any markings, which has been found characteristic of a number of birds that follow this primitive method of nesting. The weights of the eggs were 12.5 and 12.2 grams, and the measurements were 35.2 x 27.1 millimeters and 33.5 x 27.0 millimeters, respectively, roughly an inch and a third long.

The nest, though deserted by the termites was occupied by a host of small brown ants, which quickly covered my hands and arms when I reached in to remove the eggs for study. There were also a number of buzzing flies always in evidence about the entrance tunnel to the nest but I soon learned that neither the ants nor the flies could do any serious harm. It required all the courage I could muster, however, the first time I thrust my arm into that forbidding, gruesome looking nest cavity which in addition to the insects, was made repulsively wet and slimy by the frequent downpours of the rainy season. I cannot image a less attractive site, for even the clay bank holes of the motmots are much more attractive. It is not known whether the termite nests afford the usual nesting site of these beautiful trogons, but it is noted that the little paroquets, *Brotogeris jugularis,* frequently use these curious structures as a place to lay their eggs and rear their young.



JUST FOUR DAYS OLD

Above are a pair of baby trogons with eyes not yet open. Below are the opened fruits of the sand box tree, their favorite food

Both the male and female massena trogons took part in the incubation of the eggs and later in the feeding and care of the young. While the principal food of the adults consists of fruits and seeds, practically all of the food delivered to the young during the first few days consisted of winged insects which were torn to bits usually at the entrance of the nest. The adults were cautious and deliberate in returning to their young although at other times they seem quite fearless of man when approached in the woods. When nearing the nest they kept up a continual "Kaw, Kaw" call in answer to the complaining notes uttered by the young in the nest. Invariably the birds carried the food in their bills and apparently most of it given to the young is delivered directly and not by a process of regurgitation. The young when hatched were naked, without a vestige of down. At the age of four days the papillae of the juvenal plumage began to appear along the principal feather tracts, especially in the region of the wings. Unfortunately the young we had found disappeared before the end of a week. Apparently they were taken by some prowling animal that broke into the nest. The large number of nests which are destroyed in the jungle, before the young reach maturity, is appalling. The struggle for existence is so intense that it is surprising that defenseless birds such as the trogons are able to survive as a species. But it is likely that the brilliant coloring becomes in the case of the trogons a protective device, rather than a detriment, due to its practical obliteration in the dappled shades of the jungle.

To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

Two Eclipses In April

Sun and Moon to Hide this Month

by Isabel M. Lewis

April will be an eventful month in the heavens. On April 13 the moon will go into a small, partial eclipse, visible to observers in the two Americas, on the Atlantic and Pacific Oceans, and in southwestern Europe and northwestern Africa. During this eclipse, however, only about eleven per cent of the moon's surface will be covered by the earth's shadow. It will commence at 12:20 A. M., E. S. T, reach its maximum at 12:58 and end at 1:35—one hour and fifteen minutes.

The more important event, however, will be the solar eclipse on April 28. As is often the case with important happenings, it will be a more exclusive affair and will be visible as a total eclipse only from a narrow strip of land about one half mile wide and several hundred miles long. This strip passes a little to the north of San Francisco and Sacramento, grazes the southern extremity of Honey Lake, crosses the Black Rock Desert and Kings River Valley in Nevada, the extreme southeastern corner of Oregon, and goes thence diagonally across Idaho a few miles south of Silver City and Boise City. From there it crosses the Rocky Mountains into Montana, where the eclipse changes from total to annular.

Several scientific expeditions will endeavor, of course, to get within this narrow section of the country with scientific instruments. The astronomical importance of total eclipses of the sun is great, even when the duration is as momentary as it is in this exceptional case. In fact, this is the first total solar eclipse visible in this country since the eclipse of January 24, 1925, which was seen by several million people in New York and New England.

The coming eclipse is of that peculiar kind known as a central eclipse of total-annular type. In it the vertex of the moon's shadow-cone just barely grazes the surface of

the earth, falling slightly short of the surface at the portion of its path where the eclipse is annular, and lying just beneath the surface at the places where the eclipse is total.

In an annular eclipse of the sun there is a narrow annulus or ring of light seen surrounding the moon at the time of greatest eclipse. An eclipse of this type always occurs when the relative positions of earth, sun and moon are such that the moon's cone-shaped shadow falls short of the earth, at the time when the moon is passing between the earth and sun. In that case the apparent diameter of the moon's disk is smaller than that of the sun, and as a result the sun is not completely covered by the lunar disk.

The eclipse of April 28 will begin in the Pacific Ocean at sunrise and the moon's shadow will sweep rapidly across the earth in a north-easterly direction toward the coast of California. The eclipse will be annular over a very narrow path until it reaches a point near the coast in longitude 125 deg. 29 min. west of Greenwich and latitude 35 deg. 28 min. north. There it changes from annular to total. It continues as a total eclipse to a point in longitude 112 deg. 23 min. west and latitude 45 deg. 40 min. north where it changes from total back to annular. Although the eclipse will be annular for most of its course in Montana and in Canada, it will present a magnificent spectacle to those who are within the path of the annulus. The position 106 deg. 14 min. west longitude and 48 deg. 54 min. north latitude, is that of a point on the central line of the annulus near the boundary between the United States and Canada. The approximate path of the total-annular eclipse in the United States may be found by plotting and connecting with a straight line on an atlas of the United States the three positions which we have given. Another point on the central line of the annular eclipse is in Manitoba in longitude 100 deg. 31 min. west and 51 deg. 13 min. north latitude. The path of annular eclipse, after passing diagonally across Canada through Saskatchewan, Manitoba and Labrador, crossing Lake Winnipeg and Hudson Bay in its course, leaves the earth at sunset in the north Atlantic.

The most unusual feature of this eclipse from the astronomer's point of view is the fact that those who wish to make scientific observations of the eclipse may have difficulties in locating the exact position of the path of total eclipse since it is barely one-half mile wide and its position is uncertain by several times its width. This is due to the effect of the fluctuations in the moon's position which cannot be predicted accurately in advance by the theory of the motion of the moon. It is only through observations of the moon's position made shortly before the eclipse that the effect of these irregularities in the moon's position upon the eclipse path can be determined and the necessary corrections made as to the position of the path. Ordinarily, when the path is from sixty to one hundred miles or more in width, an error of a half a mile or so in its width is immaterial. In this case, however, a difference of half a mile in position means that either the scientific observer will see a total eclipse and be successful in making his scientific observations or he will be outside of the path, see a partial instead of total eclipse, and be unsuccessful in his efforts. It is only the total phase of a solar eclipse that is of scientific value.

It has been said that the solar corona, that beautiful and mysterious outer envelope of the sun that changes continuously in form with sunspot frequency, may be seen only during the total phase of a solar eclipse. Observers of the total eclipse of January 24, 1925 noted however, that the solar corona was faintly visible about twenty seconds before the beginning of total eclipse, increasing in intensity continuously until the sun was completely covered by the moon and fading away gradually after totality. This was particularly noticeable at high elevations because of the lower density of the atmosphere. The observers of the coming eclipse who choose high altitudes for their sites of observations, and there will be many opportunities to do so since the path traverses an extremely mountainous region, should be rewarded by a view of the corona lasting for at least a quarter of a minute and possibly longer. The chromosphere, the rosy-tinged lower atmosphere of the sun in which originate the great solar prominences of hydrogen, helium and calcium rising frequently to heights of tens of thousands of miles above the solar surface, should be particularly conspicuous in the coming eclipse. This is because the diameter of the moon will be so slightly in excess of that of the sun that more than the average amount of the lower atmosphere of the sun will be visible.

Scientific observers are planning, on account of the uncertainty of the exact location of the half-mile wide eclipse path, to occupy several stations about a quarter of a mile apart in a line at right angles to the eclipse path. Otherwise the erratic moon might disappoint them with a partial instead of a total eclipse.

In California the total eclipse will occur about 11 A. M., P. T.; in Idaho about 12:15 P. M., M. T., and in Montana a few minutes later than in Idaho. In Berkeley, Sacramento and Boise City 99 per cent of the sun's diameter will be covered by the moon at greatest eclipse, in Carson City and Helena 97 per cent and 98 per cent respectively and in Butte about 99 per cent. There will be a very large partial eclipse in all the northwestern states, the magnitude decreasing with distance from the central line. In the Central States the maximum eclipse will occur near two o'clock and in the Eastern States about fifteen or twenty minutes after three o'clock. At Washington the eclipse will begin at 2:09 P. M., the greatest eclipse will occur at 3:23 P. M. and the eclipse will end at 4:30 P. M., E. S. T. The magnitude will be 49 per cent. It will be 54 per cent in New York, 58 per cent in Boston, 64 per cent in Chicago, 56 per cent in St. Louis, 30 per cent in New Orleans, 36 per cent in Atlanta. At the Lick Observatory on Mount Hamilton, Calif. the magnitude of the eclipse will be 97 per cent and at the Mt. Wilson Observatory near Pasadena, California, 85 per cent. An expedition will be sent to the path of total eclipse from the Lick Observatory, one of the long series of Crocker eclipse expeditions, which according to reports at the present time will locate at Oak Valley near Crampton-ville, California. Other favorable sites in California are at Mohawk at an elevation of over 4,000 feet or at

(Continued on page 255)

FRIENDS OF MY SOLITUDE

By Shasta Leila Hoover

THE friends of my solitude out-number by far those of my social life. This may be because Nature and Art are more easily approached than persons. These friends are not sticklers for conventions; they never demand a formal introduction; they never accuse me of neglect or deceit; they never condescend to apologies. They are consistent in all they have ever said or done; they are constant, genial and sympathetic, pointing ever to the great Beyond toward which we are steadily moving. They give rest to the tired heart; they bring calm to the troubled soul.

My father came West when I was a small child and took up a homestead in the forests of the Northwest. Having no playmate other than an old bull dog, I was thrown on my own resources for entertainment. At an early age I learned that between myself and the things of Nature, there was a language. This language consisted of feeling rather than words. I also learned that in order to receive and communicate Nature messages, I must keep a clear conscience. After a bit of temper or wilful disobedience, I found myself shut out from companionship with the Spirit of the Forest, and it took days and sometimes weeks before I could again be established in my former state of enjoyment. I, therefore, came to be known as "a good child," not because I wanted to be good but because I wanted to keep my place and communion with Nature.

When I left the forest and entered school, Art opened the door to the treasures of the past. Books became a passion. I gathered them from every quarter; I spent all my extra money and some that was not extra for them. I spent every spare moment reading—while waiting in a store, while riding on a street car or when eating my breakfast, and many times when I should have been sleeping. Thus I made their acquaintance and found in them the delight and satisfaction second only to the joy I had found in Nature.

These Friends of my Solitude are not merely things; they are realities with souls. The walnut tree that stands by my window with graceful limbs and beautiful foliage, responsive to every breath of air, glowing in the morning sunshine, shivering in the evening shadow, is something more than a tree. It is a living, breathing, enduring reality. This book on my table is something more than the "embalmed mind" of a man who lived centuries ago. It is a great force, shaping the destiny of the world. These things are true magic; they are instinct with life; they have souls.

I come to my room after a long day's work. I close the door and am alone. The day has been a hard one; my friends have misunderstood me; my labors seem all in vain. I am glad, I tell myself, to be away from the thankless, unappreciative world of men. I am weary of it all; I want to forget it. Turning to my favorite author, I pick up the book and open it at random. I sit by the window with the open volume and look at my walnut tree in its regal beauty, glowing in the light of the setting sun. Gradually there enters my consciousness the presence of an understanding, a quieting

(Continued on page 255)

SEEDS
CULTIVATION
FERTILITY
SOIL CONDITION

The foundation of all garden success is the condition of the soil

Soil condition is the most important element in a garden. Admittedly, flowers now grow in your garden; but no plant will produce its maximum beauty and luxury unless the *mechanical condition* of the soil is such that it gives decided stimulation to root development. It is *soil condition* more than fertilizer that stimulates root action.

Let's demonstrate.

We'll start with clay. Water runs off as it does from a duck's back. It becomes muck. No absorption; no aeration; no holding power for the precious water which plants must have in just the right volume. Clay is too tight and compact.

Take sand. Again no holding power, because of excess drainage. Water and food leach rapidly away, are wasted.

But if you mix sand and clay you would still lack the most important element—organic matter—humus. And most soil does lack this needed organic matter, which contributes the humus to soils. That is why so many plants fail to make satisfactory progress. Organic matter holds moisture, and moisture dissolves plant food, so that a properly conditioned soil acts as a reservoir for all of the food and moisture a plant needs to produce maximum results.

Commercial growers long ago discovered that Pioneer G P M Peat Moss is the best material for supplying this organic matter. They use it not only when soil is heavy, or loose and sandy, but also to replenish the available humus which must be kept in the soil at all times.

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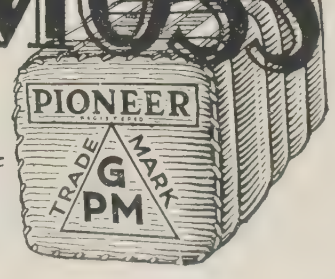

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THINGS to THINK ABOUT

A Page Devoted to Conservation from Varying Angles

Killing Our Eider Ducks

We note in a Maine paper that a prominent Bostonian, dealer in automobiles, has been fined $2700 in Portland for having in his possession ninety eider ducks, killed in violation of the Migratory Bird Treaty Act.

These birds are protected at all times because of their value as producers of a fine quality of down, which is taken from the nest without interfering with the increase of the species. The female replaces the lining that has been purloined, and proceeds to raise her family as if nothing had happened. To the inhabitants of the Labrador Coast, who jealously guard the birds from harm, the eider is thus a source of income in a land where living is hard.

Besides the fact that the bird is of economic importance as a live bird, the eider is not a sporty duck, and the motive back of this act of vandalism is a mystery. It would seem that to some persons the opportunity to kill a bird whose taking is denied to law-abiding citizens is a temptation difficult to resist.

This incident, however, should serve as a warning to those who think they can violate a beneficent statute with impunity, that sentiment for the protection of our birds is becoming a vital force. When this feeling shall have become general a new era in wild life protection will be born.

Wanted—A Change

Not long ago the editor of a popular outdoor journal, a man nationally known as a conservationist, wrote an editorial on the value of game birds. In this he asserted that our game birds lack the esthetic value of birds such as the bluebird, but are desirable only because of the sport they furnish, and the value of their carcasses as food. Such an utterance is evidence that we need to emphasize a different point of view.

This man must be considered to represent the viewpoint of a great many, for he is the editor of a widely circulated sportsman's magazine. To such a one the sight of a wedge-shaped flock of wild geese, winging their pathless flight from their nesting grounds in the sub-arctic to their winter homes in the Gulf States, bringing to thousands, pent up in cities, a breath of the wild free air of the unspoiled wilderness, inspiring the poet to some of his finest fancies, is no more than a mess of meat shot on a baited pond. The woodcock, weaving through the evening sky his twittering circle as he serenades his mate, is only a few ounces of dark meat shot down before the pointing dog. The bobwhite, whistling his cheery call to his mate in the stubble, represents to such a soul only a plump-breasted morsel checked in his rapid flight by a charge of shot.

How long will we be content to leave in the hands of such men the fate of some of the finest of our birds?

BILLBOARD SURVEY

For the past two months Mrs. W. L. Lawton of the National Council for Protection of Roadside Beauty has been conducting an intensive demonstration survey of the billboard and highway beautification situation in North Carolina. This survey has been made through means provided by the American Nature Association and in cooperation with our Association. The results will shortly be published in a report, copies of which may be had, when available, by sending your request to the Editor, Nature Magazine, 1214 16th Street, Washington, D. C.

The Plight of Ruffed Grouse

Now when most of its habitat is blanketed in snow, we wonder how fares the ruffed grouse. Not that we fear for those that have survived the hunting season—for no bird in the world is better equipped to care for itself in winter than this beautiful species. It grows snowshoes in the fall; it roosts on branches of trees, or beneath the snow itself; its food consists of leaves, and fruit and buds, many of which can not be buried, so it is seldom at a loss. Removal of the original forest cover is a benefit rather than an injury, for this brings an increase in the plants that furnish its food. But with the removal of the forest have come more people, with more and better guns, and quicker means of transportation, and its former teeming numbers have been brought low.

The present season has seen additional safeguards thrown around this splendid bird. The hunting restrictions have not arisen from any mere desire to help this species, but through fear that it disappear altogether from its once populous haunts. Even those responsible for its scarcity are alarmed at the pitiful remnant. These are the states that do not legalize its capture at any time: Alabama, Connecticut, Georgia, Illinois, Iowa, Kansas, Massachusetts, Minnesota, Mississippi, Missouri, New York, North Carolina, Ohio, Pennsylvania, South Carolina, South Dakota, Tennessee, Vermont and Wisconsin.

Here, even its enemies fear for its life. Mark these states on the map that shows the range of this once abundant bird, and see how low the gun has brought it.

But why should we worry, when so many states have granted protection to the grouse? This is the answer: Because each state is watching for the smallest increase that will afford an excuse to turn loose again on the bird its thousands of guns, and their allies, the trained dogs.

A Bird Lovers' League

This is an association that is designed to help all birds. Why should it not include all harmless animals also?

The league has already more than 20,000 members, scattered all over the British Isles, Canada, the United States, South America, South Africa, Australia and New Zealand, France, Switzerland, Germany and many other countries. It seeks members throughout the whole world. The Prince of Wales is a member. Everything is honorary. Anybody can join; it does not cost anything to become a member, and each member is sent a small badge when enrolled. Its motto is:

"He liveth best who loveth best
All things both great and small."

The rules, slightly modified the better to suit conditions in the United States, follow:

1. Not to kill any wild bird, nor take any eggs or nests, and to try to prevent others from doing so. Permits can be obtained by farmers and others who have to keep down harmful birds.
2. Not to catch or keep in a cage any wild bird, and to try to prevent others from doing so.
3. To put out food and water for birds in frosty weather and water in hot weather.
4. Not to buy or wear any feathers (except ostrich and poultry), and to try to prevent others from doing so.
5. Not to burn, or destroy in any way, trees or bushes, and to try to prevent others from doing so.
6. To try to get more members for Bird Lovers' League.

Joint Presidents: M. M. Benson, S. V. Benson. Address: Bishops Hill, Polzeath, Wadebridge, Cornwall, England.

Flappers and Furs

Miss Ima Dumbunny, winner of the beauty contest held by the Silver Rabbits Association, says that, as far as she can see, even if an animal has suffered a few days in a trap, it can do no harm to wear its skin now that it is dead, and anyway, her furrier, Mr. Izzie Skingame, says it will be only too easy to give her a guarantee that any fur he sells was killed humanely, and besides, she thinks any animal ought to be glad to suffer a while with the prospect of adorning her neck, for it makes her look perfectly lovely, and she don't see how it makes any difference if furs are a little warm in summer, when you can get such lovely cool drinks at any soda fountain, and suppose leopard coats are made out of stencilled rabbit skins, what is the difference if you can get away with it, and besides, if it wasn't for the fur-trade, the foxes would eat up all the rabbits, or the rabbits would eat up all the foxes, she has forgotten which.

wer, a unifying influence. I have read thing in my book; I have said nothing my tree; but the soul of my book rises to comfort me and the presence of my e bids all weariness be gone. As from a sion, I arise with new strength and new termination. I am myself again, in har- ony with my work and my fellow-workers. here is no misunderstanding; everything right. I will do better work tomorrow; will prove myself a better friend.

What has brought about the change? hat has banished the darkness and re- ored the light? The Friends of my Solitude ve spoken and my Soul has heard their ice.

WO ECLIPSES IN APRIL

(*Continued from page 252*)

oney Lake. There will undoubtedly be, so, many automobiles parked along the ail of the moon's shadow in Northern alifornia, Nevada, Idaho and Montana on e eventful morning of April 28 when the n and moon play hide and seek.

Among the planets this month Venus will visible low in the west at sunset. Jupiter also in the western evening sky in aurus. Mercury is at its greatest eastern ongation on April 27. It should be visible r about a week before and after this date the northwestern sky after sunset. This ne of Mercury's favorable elongations nd it should not be a difficult matter to nd it in the evening twilight at the time entioned. It is very similar to Vega in ppearance at that time.

Saturn is now in the eastern morning y and will be seen due south at sunrise n April 2. Mars enters the constellation f Pisces this month and may be found in e southeast shortly before sunrise.

The Big Dipper is now approaching the eridian above the pole and The Sickle in eo is due south at 9:00 p. m. Orion is isappearing below the southwestern hori- on and Taurus, Gemini and Auriga and e two Dog Stars, Sirius and Procyon, ill linger in the west. Hydra, The Water- ake, with its riders, stretches across the outhern sky.

State Park Meeting

Those interested in various phases of the evelopment of State Parks are looking rward to the tenth annual meeting of e National Conference on State Parks. t will be held this year at Linville, North arolina, from June 17 to 20, according the dates tentatively set. In order that e meeting may offer greater value to en and women in the park, forest and ame administrative field, separate pro- rams of a more professional type are being anned for this group for at least two venings of the three which will be spent Linville. In addition, one morning or fternoon session is to be set aside entirely informal discussion without any set eeches. This will probably be held on ext to the last day, and will afford a aluable opportunity for the people from e Southern States, many of whom are ected to be present to ask questions acquire information of special value them.

"Consider the Lilies"

Lilium auratum

Lilium regale

HARDY LILIES, planted among other plants in the Hardy Border help to glorify it and maintain a colorful display from early summer until Fall. They are friendly creatures, almost human in their appeal to the senses of mankind, creating surroundings in which he may live a better life in a more beautiful world. They are always among the first choice of professional gardeners and enthusiastic amateurs, and it is their enthusiasm and support that has encouraged us in our work of the past 10 years in seeking the lost or unknown Lilies that are indigenous to unexplored regions of the Orient.

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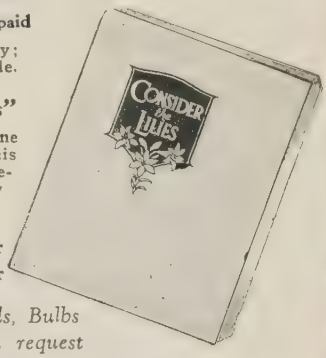

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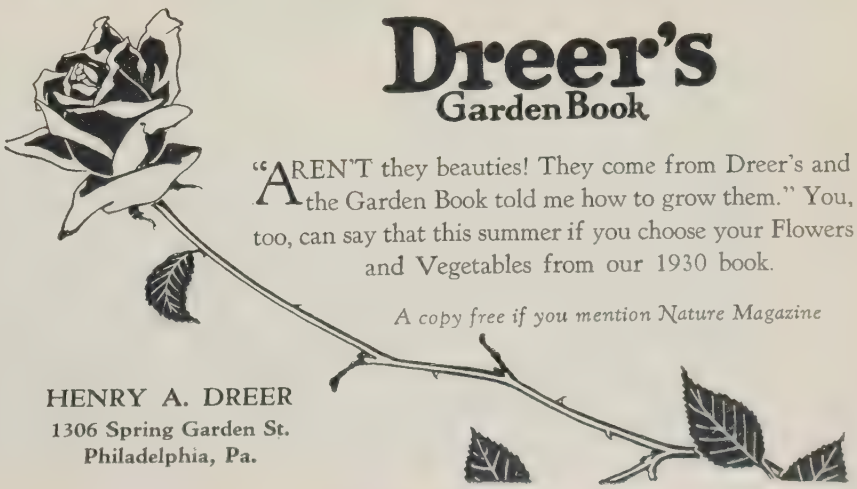

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HENRY A. DREER
1306 Spring Garden St.
Philadelphia, Pa.

OUR recent article on the billboard problem in California brought various comment, the great bulk of it commendatory and appreciative of our having stated the case. We do not wish to seem to "pick on" California because the blight is certainly not limited to that State. In fact, our object is to lend fuel to the rapidly rising flame of public sentiment that is declaring itself in California and elsewhere. The people of our beautiful west coast state are recognizing the tremendous value which lies in their scenery and are moving to reclaim it. Under the aegis of the California Development Association a system of scenic reserves, or protected highways, is being built up. This movement is helping greatly, but the pictures on this page, taken by John Edwin Hogg, show what kind of a problem it is and what sort of work is to be done.

At the top of the page we have a "view" of the snow-clad Sierra Madres from the famous Foothill Boulevard near Pasadena. Behind this atrocity and at the right is noted Mount Wilson. At the left stand several blank boards showing how the yeast of public sentiment has begun to work and how advertisers are recognizing the revulsion of feeling. This is on the Foothill Boulevard between Eagle Rock and Pasadena

At the right is a picture of the gauntlet of billboards that motorists must run on Huntington Drive between Los Angeles and Pasadena. At the bottom of the page is a scene along El Camino Real between Los Angeles and Ventura. The billboard interests contend that no landscape beauty can be ruined here because this is a commercial highway used by trucks. It happens also to be the main highway for pleasure and tourist traffic

Helps and Hints

FOR HOME AND GARDEN

PLANTING THE GARDEN, MONTH BY MONTH

By Romaine B. Ware

April is one of the important planting months of the garden year. New beds and borders can be planted this month, as many perennials can be handled soon after the frost leaves the ground. Preparations can be made for the annuals to be set out later and for seed beds where seeds may be started when the soil dries out and warms up a bit. Don't be in a hurry to plant seeds outdoors because if the weather is cold and wet they may rot rather than grow.

Hot beds and cold frames are most valuable at this season because with them, growing conditions such as temperature and moisture are more easily regulated. If your garden time is limited to early mornings and late evenings together with week ends, you may find a cold frame more practical than a hot bed. A hot bed with the possibilities of excessive heat, requires more exacting attention than a cold frame. The latter can not be started as early but is much easier to manage.

This is the season for planting roses in many sections of the country and there are many little details that may well be considered. Roses are among the most important of all garden flowers, everybody loves them and wants to grow them but it seems that not everyone is interested to the extent of learning the best methods of handling them. Of the hundreds of thousands of roses planted each year, but a small share of them are so handled that they may do their best.

First they are best cared for in beds rather than among other things and they should never be planted in holes cut in the lawn as we see so many all over the country. In separate beds or even in separate gardens, they may not only be cared for the easiest but they will make the best show. As for location, roses need full sunlight at least two-thirds of the day and shelter from severe winds though there should be some circulation of air. They will not thrive where they must fight with the roots of trees and shrubs in the soil and above all they must have good drainage. This may sound as if they are extremely particular as to their location but the above requirements are not difficult to meet.

Experience has shown that a clay soil is best for roses, a medium clay soil, known as a "clay loam", is ideal. Clay is rich in plant food but is difficult to work, generally lacking in humus. When preparing soil for roses it may virtually be made to order, adding clay and humus to light soils or sand and humus to heavy soils. Humus is most important as it not only aids light soils in retaining moisture but helps heavy soils to drain properly and by aerating the soil, increases bacterial action so necessary for the liberation of plant food. Strawy

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ROSES—*Spring Planting*

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ROSES by **Bobbink & Atkins**

The 1930 edition is replete with up-to-date varieties—it is more than a Catalog, it is a reference and guide for American Rose Amateurs and Growers; it presents late introductions which offer new surprises, and includes many favorites of olden days. Many are illustrated in color; correct descriptions are given with comments on their merits and demerits; cultivation instructions are simplified; all are classified and arranged to make ordering easy; pen and ink sketches show planting steps and how to secure the most perfect flowers. A copy will be mailed on request to those who intend to plant Roses.

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3 **Auratum** (Gold banded)—Pure white, dotted with maroon, each petal banded with golden yellow through the center. 5-6 feet..... 1.50
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manure thoroughly incorporated with the soil not only supplies food but adds humus as well. Soils that have been cropped and recropped without liberal additions of natural fertilizers generally lack humus but this deficiency is easily remedied by adding leaf mold, commercial humus or granulated peat moss.

No small measure of the success with roses depends upon the actual planting. If this is done carelessly the plant can not be expected to thrive. In well prepared soil, made reasonably fine, dig a hole large enough and deep enough to spread the roots naturally. If the roots can be so arranged, spread them over a mound or cone of soil built up in the hole and work fine soil in all around them. Make sure there are no air pockets and as you fill in the hole get in it with your feet and tramp the soil solidly. This should not be done if the soil is wet, in fact it is difficult to do a good job of planting if the ground is very wet. When the planting is complete have the surface of the bed level and keep it level, never hilling up around the plants as is seen in so many gardens.

When preparing the bush for planting, cut off any decayed, broken or bruised roots and shorten any extra long ones so that they will go in the hole without crowding. Make clean cuts so that they will heal promptly. Prune back the branches to within six inches or less of the ground. Don't be afraid to cut them as all the bloom is produced upon the new wood grown this season. The more severely they are pruned the better the quality of flowers. This rule as to pruning does not apply to climbers as they produce their bloom upon the wood of the previous season's growth. Always prune them just after flowering. Climbers when planted should be cut back to within about twelve inches of the ground.

At planting time be careful not to expose the roots to the air and wind even for a few moments. The tiny hair-like roots are so easily killed if not protected. Keep them covered with wet burlap or moss. They might even be carried around the garden in a pail of liquid mud. Sometimes one receives bushes that for some reason or other have been allowed to dry out till they are all shriveled up. If planted in that condition, there is little chance of their surviving. The best method is to bury the bush a few inches deep right out in the garden. The whole plant should be under ground and at the end of ten days when they are dug up they will be found to be plump and green, ready for planting. Do not bury them for this purpose in bundles but each bush separately. Many a valuable plant has been saved this way that otherwise could not have been brought through.

Care should be used to set the plants at the proper depth. The "bud" should be just below the surface of the soil. Too deep or too shallow planting results in poor growth and few flowers. See that they do not settle after planting by checking up on them a few weeks later.

The care of roses is another story and can not be included here but they will not thrive if neglected. Cultivation, feeding, watering and especially dusting and spraying must be attended to regularly. Have the necessary supplies and equipment on hand before they are needed and use them in time. Preparedness must be your motto

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nd timeliness your watchword. Frequently matter of a day or two in the application f a spray will more than double the amage and increase the task many fold. Selection of varieties will be entirely according to one's taste. Too, it will depend omewhat upon the kind of a garden one esires. There are the very popular, everblooming, hybrid teas, (H. T.'s) that make p the bulk of all rose gardens today and he older and more vigorous growing hyrid perpetuals, (H. P.'s), blooming rofusely in June but hardly at all at ther times. The H. P.'s are by far the ardiest of these two classes but with care he H. T.'s can be wintered except in the ost severe sections. Many other classes nd types are available but are not as well nown as their excellent qualities warrant. Among them we find trailing and creeping forms, invaluable for the wild and emi-wild garden. There are also many arieties more like shrubs than the H. T.'s nd H. P.'s and they should not be planted with them. They have a distinctive place n many gardens where the owner would ave something different. You will find hem worth study both in the catalogues nd in the fields of the growers. If you ver visit the wonderful plantings at the Arnold Arboretum, Boston, Mass., you will find their collection of these shrub or specie roses, as they are called, most interesting. Specie roses have been collected from all over the world and present many interesting types, practically all of which are available for planting in our gardens if we only knew about them.

The study and cultivation of the rose can become a most engrossing hobby. It is not an avocation for lazy man but once you glimpse beyond the curtain of the ordinary rose planting and learn the possibilities of rose culture, you will find yourself upon the threshold of a world of beauty. A Persian poet of unknown name sings:

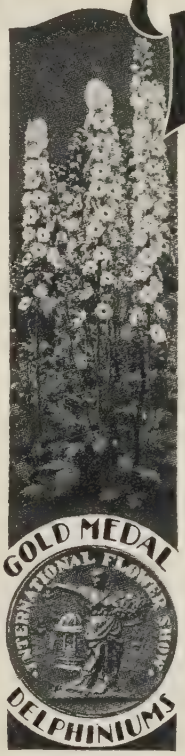
"Learn ye, O seekers, Wisdom's self reposes
Close by, in yonder burning bush of Roses,
Whence if your ears be open, ye may hear
God speak to you, as once he spake to Moses."

Grayling Disappear

The last of the famous Michigan Grayling, of which E. A. Hyer wrote in the September, 1929 issue of Nature Magazine, have disappeared from the lower peninsula of Michigan and but a few remain in the Otter River in the upper peninsula, the State Department of Conservation reports. The last resource of fish propagation—the transplanting of 130 from the Otter River to the Gladwin Game Refuge on the Tittabawassee River—has failed, the fish have dwindled, and at last, admitting defeat, the Department has removed the screen segregating the experiment. Why the grayling, whose game qualities made him famous among anglers throughout the nation, should have disappeared, when once he choked Michigan streams, is a mystery. Perhaps the cutting of the pine forests, perhaps the advent of brook trout, which preyed on his young, caused his demise. The over-fishing of a generation or two ago of course contributed. Whatever the cause, the grayling has joined the passenger pigeon as a legendary figure in the lower peninsula of Michigan.

New! Duckham's Delphiniums

NEW COLORS
NEW TYPES-MASSIVE SPIKES



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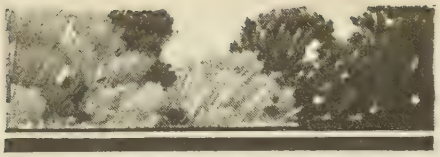

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Five gorgeous Water Lilies, including day and night bloomers. Each a different color. *Capensis,* blue; *Dentata,* white; *Zanzibariensis Rosea,* pink; *Rubra Rosea,* carmine; *Dauben,* blue.

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Includes 3 Water Lily Plants, pink, blue and yellow; 20 Aquatic Plants in 10 varieties; 12 Goldfishes; 2 Calico Fishes; Assortment of Jap Snails, Tadpoles, etc.; 1 Carton of Praefecta, our new fertilizer. All for..... $10.

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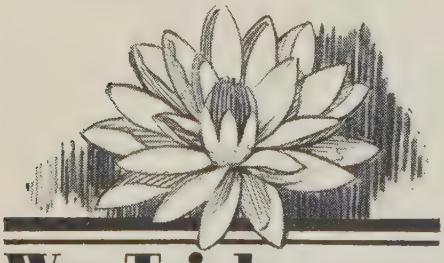

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Winter in Glacier

A severe winter in the northern Rockies again took its annual toll of the wild life in Glacier National Park, according to a report from J. R. Eakin, superintendent of the Park. There is no cause for alarm, however, he points out, because with one exception this is merely Nature's way of keeping the various species virile and vigorous and restricting the animal population so it will not exceed the food supply. The "survival of the fittest" insures there shall be no weaklings carried over into the breeding season to lower the virility of the denizens of the wilderness.

The one exception is peculiar to Glacier National Park. The Great Northern Railway skirts the southern boundary of the Park and near the area of the greatest concentration of deer. Some deer desert the feed yards, to go outside the park and walk on the railroad track to escape the deep snow. More than thirty have been killed by trains and nothing can be done about it. Despite this handicap, deer are showing a gratifying increase.

Nature's ways of preventing too rapid increase in wild life are losses from predatory animals, breaking through air holes on frozen lakes and rivers, snowslides and "winter kill". An animal not sufficiently vigorous to rustle for food dies of cold and starvation. This is called winter kill. It is Nature's trump card to prevent the breeding of inferior animals.

Coyotes were not numerous in the Park this winter. Signs of only one mountain lion were discovered by rangers on patrol and no evidence of wolves was observed. Probably several reported coyote kills were really winter kills upon which coyotes have been feeding.

Contrary to the usual belief snowslides are destructive to moose, elk, mountain goats and bighorn sheep. Several years ago one snowslide destroyed four elk. Last winter another slide killed two moose. Deer usually drift to the lower valleys and escape this menace.

Once in a blue moon moose bog down in lily ponds, their favorite feeding places, and cannot escape. A very few animals run against sharp sticks and are so badly torn they die. Deer and elk may become frightened and jump over precipices. However, losses from such causes are rare.

Flying the Grand Canyon

Amid the growing herd of deer peacefully grazing on the South Rim of the Grand Canyon, there are eight deer who have experienced a sensation like no other members of their family ever felt before—and doubtless they have told all about it. These eight were the first deer, so far as known, to be transported by airplane, and they were brought from the Kaibab country, where the range is insufficient, to better feeding grounds. Formerly deer were transported by truck along a road which necessitated 30 hours of travelling. Their expedition lasted but three hours. The Kaibab, incidentally, illustrates the effect of destroying the balance of Nature by killing off too many predatory animals. While conditions are improving, several years ago the deer population increased to such an extent that there was wholesale starvation, and in some places all the vegetation was stripped from the trees as far as a deer could reach.

Bugs need not ruin your beautiful plants, flowers, shrubs and evergreens. Destroy them through the use of Wilson's O. K. Plant Spray . . . the nationally recognized standard insecticide. Wilson's O. K. Plant Spray is non-poisonous, easily applied and is equally effective in-doors or out-of-doors. Recommended by the Officers of The Garden Club of America. Half-pint 40c; Quart $1.00; Gallon $3.00; 5 Gallons $12.00; 10 Gallons $20.00.

Trade Mark Registered

Wilson's O. K. Plant Spray is sold by leading stores everywhere and the genuine may be identified by the famous Trade Mark. Write us, if your dealer cannot supply your requirements.

Then there is Wilson's SCALE-O . . . the powerful *dormant* spray so necessary to the successful growth of fruit and other trees. Scale-O kills Scale insects and eggs—even in Winter. Mixes readily in cold water . . . covers very rapidly and evenly. 1 Gallon $2.00; 5 Gallons $9.00.

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36 BEAUTIFUL COLORED POST CARDS
of Wild Flowers Needing Protection. 25c per doz.

Wild Flower Motion Pictures

Eastern & Western in 35 and 16 mm. Rented $1.25 up; sold $7.50 up; list on request. See flowers open and close.

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of flowers, orchids, state flowers and ferns with printed lectures rented $5.00 postpaid; sold $60.00.

Plant Wild Flower Seed

150 kinds listed. 10c pkt. 12 pkts. $1.00

58 Outline drawings of Flowers
for coloring 12c per doz., 75c per 100

Junior Chapters of 25 or more at 10c each receive magazine, 10 pkts. seed, posters and set literature; each member receives button, 6 outlines and 3 circulars; Annual members at $1.50 receive magazine and free Holly plant or 6 pkts. seed; Subscribing members $5.00 and contributing members $10.00 get magazine, Holly and 12 pkts. seed if requested.

WILD FLOWER PRESERVATION SOCIETY
3740 Oliver St. Washington, D. C.

Evergreens and Birds

Pines, Hemlocks for nesting sites. Juniper berries for food. Watch the plants grow tall, then watch the birds come. ORDER NOW: 12 Healthy, transplanted plants 10-12" high $5.25 postpaid.

Send For Catalogue

PIEDMONT FORESTRY CO. Bound Brook, N. J.

One Black Crow

Oliver Sheppard of Penn Yan, New ork, sends us an interesting clipping from ne local newsaper, printed under the cap- ion "One Black Crow". It says:

"One black crow makes more fun than ne Two Black Crows ever created for ie residents in the southeastern section of enn Yan. Jimmie, a tame crow belonging o Gladys Braisted, sister of Mr. and Mrs. loward Braisted of Garfield avenue, en- rtains the neighborhood every morning hile playing with two puppies.

"Daily the bird will fly to the home of uster Borst and the home of Claudia Vheeler on Lincoln avenue to romp with heir pet puppies, biting their ears, legs nd tails with its beak as the dogs run p and down the street, the crow flapping ver their heads. The neighbors enjoyed an specially hearty laugh the other morning when the black crow hung onto the tail f a very much vexed white puppy. Again he bird flew higher into the air to drop with a sudden swoop onto the nose of he black pup. The crow extracts pay for he amusement he affords the neighborhood y pulling the clothes pins off from the wires and letting the wind blow clean lothes onto the ground.

"A year ago last fall the bird was found wounded when the Braisted family was camping on the Ross Huson place near Dresden on Seneca Lake. It has been a family pet since that time and has acquired quite a repertoire of tricks."

To Reproduce Antiquity

Dinosaurs, mammoths and mastodons may be tethered along the lines of the Canadian National Railways in western Canada for the delight of American tourists. Those who pass by, however, need have no fear, for each dinosaur on a mountainside, each mammoth on the plains, each mastodon in a river bed will only be a likeness of the pre-historic beast encased in concrete. The plan is part of that undertaken by the National Museum as a monument to the wild life which roamed through western Canada millions of years ago. It is pointed out that the American Museum of Natural History, New York, has made plaster of Paris casts of some of the skeletons of pre-historic monsters. The Canadian Museum plans to have these figures constructed in concrete to last out the weather and to become as permanent parts of the countryside as the concrete abutments of bridges. A further announcement regarding the founding of a Canadian outdoor museum of natural history is expected shortly.

Arbor Day Change

In view of various circumstances the State Commission of Forestry of Alabama has recommended to the Governor a change in the day of Arbor Day from the first Friday in March to some date in the fall. It is pointed out that trees can as well be planted in the fall in that state and that the spring finds the commission occupied with forest fire protection work and unable to lend all the aid to the tree planting program that it would like. Women's clubs and other organizations join in the suggestion of a change in date.

The Ferns of New England

So common to those of us who live with them and so wonderful to those who behold them for the first time: Giant Ostrich Plumes by the river; Osmundas with their artistic fiddleheads; Maidenhair, seemingly fragile, but extremely hardy; Royal, lord of the swamps and meadows; Hayscented Fern wafting its fragrance through the autumn air; tiny Spleenworts and Polypodys clinging to rocks where such a feat seems impossible. These are a few of New England's ferns.

Ostrich Fern: Pteretis nodulosa. In full sun or partial shade, this native of the northern river banks and hollows may reach a height of six feet. Its size does not make it less graceful.

Maidenhair: Adiantum pedatum. In pockets of leafmold among the rocks, the Maidenhair Fern is most at home. It prefers shade.

Royal Fern: Osmunda regalis. Tall branching fronds of vigorous habit. Best in moist ground with partial shade, but grows almost anywhere.

Cinnamon Fern: Osmunda Cinnamonea. Rich open land or the woodland border is agreeable to this fern which grows four feet tall with wide spreading fronds.

Polypody: Polypodium vulgare. A miniature evergreen rock fern growing only 6 inches high. Needs shade.

Hayscented Fern: Dennstedtia punctilobula. Fragrant, graceful fronds a foot tall grows in mats in sun or partial shade.

Special Offer: In spite of their loveliness and seeming fragility, most ferns are easily grown and we will send you a dozen each of the above six varieties, **(72 ferns in all) for only $10.00, or six of each variety for $5.50.**

Please send for our 1930 catalog. It lists a fine assortment of native trees, shrubs, ferns and plants and also plants with foreign accents such as Jap Anemones, Daphnes, French Lilacs, Hawthorns and Lilies, and evergreens, fruit trees, berry plants and asparagus, too.

George D. Aiken, Box Z, Putney, Vermont

"Grown In Vermont, It's Hardy"

W. W. WILMORE

DAHLIAS

Look for the Trade Mark when looking for quality

For more than 40 years this Trade Mark has stood for quality and fair dealing. Stock true to name and free from disease. 1930 introductions, novelties and standard varieties. Catalog (36 pages) free.

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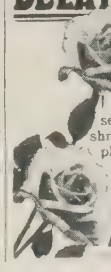

FREE to those interested—Catalog No. 16, describing selected books on flowers, fruits, vegetables, trees, shrubs, landscape gardening, soils, insect pests and plant diseases, growing plants under glass, etc.

TWO OF OUR SPECIALS:

WATER GARDENS AND GOLDFISH, by Sawyer and Perkins, $1.65; BIRDS OF THE WILD, by Frank C Pellett, $1.90, both postpaid.

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Prize Winners at leading American Shows

FOR five years in succession our Dahlias have won First Prize "Gold Medal" at New York Show—greatest in the country. Some of these winners of former years are still leaders the country over, but can be bought for a fraction of their original cost. We offer five of them below at the most amazing price Great Dahlias have ever been sold.

SPECIAL COLLECTION (N)

	Present List Price
Trentonian, amber and bronze	.75
Sanhican's Peach, peach cheek color	3.00
Sanhican's Gold, pale orange yellow	1.50
Roman Eagle, burnished copper	1.50
Margaret Woodrow Wilson, opalescent pink	1.50
Total List Value	8.25

SIZE FORM STEM (What the judges look for)

Here is an $8.25 present-day value (varieties that only a few years ago cost $5.00 to $10.00 each). Five great Prize-Winning Dahlias for **$6.00**

For the connoisseur who seeks the latest creations, we have several 1929 and 1930 introductions that have topped the list of Winners at the recent Autumn Shows. They are

"DOROTHY STONE" "KATHLEEN NORRIS"
"HELEN IVINS" "EDNA FERBER"
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Complete descriptions and prices of above will be found in our New Catalogue, the leading book of its kind in America. Mailed free upon request,—ask for Booklet N. 1930.

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"Gold Medal" Dahlia Growers"
SANHICAN GARDENS
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Genuine ENGLISH Flower Seeds

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YOUR LAWN MOWER NEEDS
→KEENEDGE←

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Dealers and Salesmen MARCUS, IOWA

Rhode Island Active

"The worm has actually turned", declares Mrs. Walter B. Peirce, Chairman of the Department of Fine Arts of the Rhode Island State Federation of Women's Clubs. By this she means that those who have been subjected increasingly to the various forms of uglification of the Rhode Island landscape—billboards, hot dog stands, unsightly signs and the like—have begun to revolt. An active campaign has been going on in the State under the auspices of the Federation. Meetings devoted to beautification have been held widely and attended fully. The main concentration has been toward the arousing of public sentiment. Men and women are signing pledges to patronize those advertisers who keep their signs off the rural billboards. A Rhode Island Committee for the Protection of Roadside Beauty is active. Several advertisers, when approached, have gladly cooperated by the removal of their signs. Others have expressed hearty sympathy but are confronted with the advertising of their competitors and are loath to make a sacrifice at present. Among the best organized of the States, however, Rhode Island is accomplishing many things which should be a help to others as example.

Woodchuck Movie

"The Eastern Woodchuck and Its Control" is the title of a two-reel motion picture just released by the United States Department of Agriculture. It shows the nature of the damage done by woodchucks, or groundhogs, to alfalfa fields, fruit trees, and garden crops, and also the various methods of control that have been worked out by the Bureau of Biological Survey, including the use of calcium cyanide and of carbon disulphide. Formerly many farm boys hunted this rodent so persistently for sport or for the bounty paid that hardly a one was alive to look for his shadow on "groundhog day," but now they seem to have forsaken the gun for the automobile and its opportunities for recreation and enjoyment, to the neglect of the woodchuck. At any rate, the woodchuck has increased in numbers so rapidly in recent years that it has actually become a menace to cultivated crops in many of the northeastern States. The new picture is of special interest to farmers and may be borrowed without charge from the Office of Motion Pictures, United States Department of Agriculture, Washington, D. C. The borrower is required to pay transportation charges both ways.

Enlarged Elk Range

An enlarged winter elk range in Jackson Hole, south of Yellowstone National Park, to be made by purchasing private ranches, is the principal key to the promotion of health of the famous elk herd, according to O. J. Murie of the U. S. Biological Survey, who has spent more than two years studying the herd. Crowding around the government feeding stations makes it easy for disease to spread; and if the government does not feed the elk, they raid the haystacks of the valley farmers. If the range lands can be acquired for elk feeding grounds, the animals can be left to themselves late into the year, and will be less susceptible to disease.

Plant Your Garden at Wholesale Prices!

Smashing Price Reduction

Why are we making such sacrifices? Well, Mr. Hendriks decided to offer them to our customers and friends at these prices. Call it advertising and get the benefit of these bargain sales to create more customers and more boosters of Quality Seed & Bulb Co. products. We own our own bulb farms here and abroad which enable us to give you guaranteed quality at rock bottom prices.

50 TOP GRADE GLAD BULBS only $1

Glads—Such beautiful varieties as America, Francis King, Alice Tiplady, Maiden Blush, Marshall Foch, Peace, etc. Elegant in borders or large beds. Fine for cut flowers.

Lilies—The following varieties: Regale, Auratum, Magnificum, Rubrum, Melpomene, Elegans, Tiger, etc.

1 Dozen Hardy Lilies $1.50

12 Peonies $2.50

Peonies—Most popular of spring flowers, unusually large size, standard 3 to 5 eye divisions.

5 lbs. Lawn Grass Seed $1.00

Make your lawn better this year with our quality, high germination grass seed. Produces an enduring velvety turf comprised of the finest varieties of grasses.

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Money saving offers for quality nursery stock, bulbs and perennial plants. Buy direct from grower. Order direct from this ad. No order for less than $3.00.
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The original Hendrik's guarantee: Money cheerfully refunded without question if you are dissatisfied with your purchase.

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100 EVERGREEN TREES $3.50

Western Maine Forest Nursery FRYEBURG MAINE

Buy From Grower At Wholesale

Beautify your home with these vigorous hardy trees, four years, transplanted and well rooted. Average height 4-8 inches. Started in severe Northern climate, they will thrive anywhere and grow rapidly.

NORWAY SPRUCE SCOTCH PINE
WHITE SPRUCE NORWAY PINE
100 of any variety or 25 of each kind $3.50

Because of the late Northern spring, these trees are dormant until May, and can be planted with success in any climate. Order now for Delivery about May 1. No shipment of less than 100. Average weight 10 lbs. per hundred. Remit with order.

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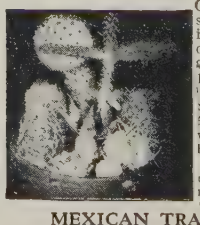
Dept. C-1 FRYEBURG, MAINE
Send for Descriptive folder

Blooming Size CACTI



Group of 25 named varieties for sun room, porch, or garden—if ordered individually would cost $14—a quality bargain buy at..... $7.

10 different named varieties with hand painted Mexican bowl. $4.
Same without the bowl $3.

5 different blooming size named varieties with Mexican bowl..... $2.50
Same without the bowl $1.50

Cacti culture book free with orders. Shipments prepaid. Send check, stamps, money order.

MEXICAN TRADING CO., Room E.
Two Republican Bldg. El Paso, Tex.

A Squirrel Scout

If there is any more ardent Nature lover in the South than J. C. Sellers of the *Farm and Live Stock Record* of Jacksonville, Florida, we haven't met him. In a recent issue of his paper, J. C. (who does radio broadcast, too) says:

"The *Record* broadcaster, every morning that he is at his home, which is quite regularly, has breakfast with birds and squirrels, providing exclusively for them with cracked corn, such as commonly is fed to chickens. And how they like it, generally waiting for the appearance of the host with the can of corn. Sometimes, Mr. or Mrs. or Miss Squirrel grows impatient, if the host is late in arising from his night's repose, and comes up on the porch roof outside the latter's bedroom window, and, in perfect and vigorously expressed squirrel language, urges the bringing of his or her breakfast. And when, ultimately, it is served, how he or she "wades in," taking time only for giving looks of appreciation, to tell how good the corn is and how it is liked. There are a dozen of these squirrel friends that have their daily breakfast with this particular host, but only one at a time is sent to call the host from the observation point, which is the coping of the porch roof or the limb of a nearby tree."

Winter—A Musician

That Nature has a musical urge seems to be proved by an interesting experience reported by Amy Bischoff of Fort Wayne, Indiana. She writes:

"During the recent storm, while working at my desk, I became conscious of some very clear dainty, sweet music. My first thought was 'radio in the distance' but at the same time I could not think of an instrument that would produce such sounds and besides the music came from the window. My next thought was 'hail or sleet on the window pane' and again at the same moment I realized that sleet on a pane could hardly produce such a range of notes, for there were very high, clear, as well as low full tones. Upon walking to the window the mystery was solved. Father Winter had hung a row of icicles on the window sash—icicles of all sizes and length—and now he was pelting them with sleet and hail, producing this sweet clear music."

Society a Centenarian

One hundred years ago the ninth of February the Boston Society of Natural History was born, a pioneer in natural science in America. Its first meeting was held at the home of Dr. Walter Channing. Among the names introduced at that gathering was that of Thomas Nuttall, who became the first president, and down through the century of its existence its membership roll has included names eminent in American natural history, education and culture. The centenary of the formation of the Society passed without observances, these having been postponed until June 3, which is the anniversary of the dedication of the Museum's building, when appropriate ceremonies will be held.

Use Invisible Rose Spray

BIGGER BLOOMS, more vigorous foliage result from roses sprayed with Fungtrogen. This modern, invisible plant stimulant acts like magic on sick rose bushes.

Wind and insects spread the spores of Mildew and Black Spot—the two worst enemies of the rose. The invisible Fungtrogen spray soon checks these diseases. Does not discolor leaves.

Easy and pleasant to use. Simply mix with water and spray. Economical! Half pint makes 15 quarts of spray. Leading horticulturists enthusiastically endorse it. Prepaid: half pint $1; pint $1.50. At your dealer's or send check.

Use "—gen" rose treatment. When insects appear on roses use APHISTROGEN, kills aphis—plant lice; and INSECTROGEN, kills leaf-eating insects. These sprays are chemically harmonious with FUNGTROGEN. Be sure to use the complete treatment

Fungtrogen
FUNGICIDE AND STIMULANT
REG. U.S. PAT. OFF.

Write for free bulletin, "Black Spot Control"

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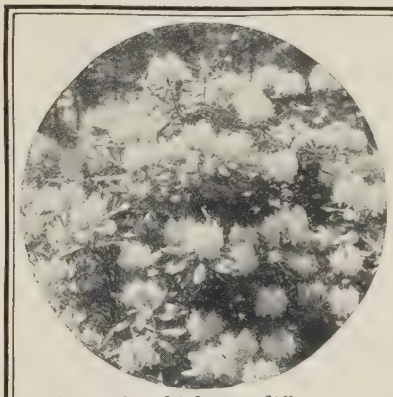
3646 Filbert Street, Phila., Pa.



Bring the glory of the hills to your home

NOTHING is more beautiful than the glorious spring blooms of Rhododendrons and Azaleas—modest white, soft orchid pink to orange yellows. Our nursery-grown native Rhododendrons can come to you at very reasonable prices. Catalog on request.

Special offer for $25 includes 12 plants, 1 to 3 feet high, ten different, enough to cover 25 to 40 sq. feet. The blooms are from white to orange, April to July—a wondrous series of blossoms.

La Bars' broad-leafed evergreens call for no maintenance expense. Cold will not kill them. They blend with all forms of architecture. Our nursery-grown stock conserves native forests.

Price for this superior collection only $25, packed, f. o. b. Stroudsburg. Please send check with order.

Each plant marked and guaranteed true to name. We have the largest Rhododendron nursery in America.

Visitors welcome to nursery. Write for full list of shrubs in this offer.

LA BARS' RHODODENDRON NURSERY
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Burpee's Seeds Grow

The Vegetables and Flowers you would like to see growing in your garden — read all about them in Burpee's

Annual Garden Book

This is the catalog that tells the plain truth about the *Best Seeds That Grow*. It describes the Burpee Quality Seeds, Bulbs, and Plants.

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WATER LILIES

Suggestions on the building and care of a pool . . . profuse illustrations, many in color; interesting descriptions of over 100 varieties of rare and exotic lilies, as well as inexpensive post-paid collections, and many other features . . . all are to be found in our 1930 catalog. This beautiful 36-page hand-book of water lily lore will be sent to you FREE for the asking.

Johnson Water Gardens
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New Discovery Guarantees Better House Plants & Gardens

This new, easy, economical method of fertilizing is being praised by everyone who tries it. A highly concentrated plant food in tablet form.

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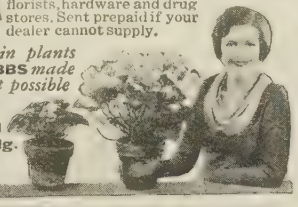
One tablet a week in pots makes plants grow magically. Will make your Roses the finest ever. Perennials thrive as never before. Annuals "bloom their heads off". Nothing better for Dahlias and Gladiolus. Use PLANTABBS along rows of flowers and vegetables. Four to a gallon of water make rich liquid fertilizer—wonderful on lawns. Small box 25 cts; medium 50 cts; large $1.00; professional size $3.50. This is the only fertilizer GUARANTEED to improve plants.

FREE Booklet by F. F. Rockwell, noted writer of garden books. Full of valuable information, free with every box of genuine Plantabbs.

Ask for Fulton's Plantabbs—accept no substitute. Sold widely by seedsmen, florists, hardware and drug stores. Sent prepaid if your dealer cannot supply.



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MAKE your garden the envy of your friends with Gove's Hardy Vermont Glads. Best of garden cut flowers—very easy to grow. Our special "get acquainted" offers will make you an enthusiastic "glad fan". Bulbs guaranteed to bloom first year.

100 Large (1" to 2") Vermont Bulbs $3

This collection includes at least 35 fine varieties, in many shades of Red, Yellow, Pink, Blue, Orange, Smoke, White, all good ones but not labeled as to name. 50 for $1.75. *All sent prepaid* with complete instructions for growing prize-winners. I believe this to be the finest "glad" collection offered anywhere.

Specialty Collection

Annie Laurie, exquisite ruffled Pink; Emile Aubrun, large bronze; Apricot Glow, beautiful Apricot-colored; Golden Dream, finest clear yellow; Marnia, very large Orange. All five rare varieties—labeled, $1. (regular $1.50 value). Both collections prepaid, for $3.85. Send for illustrated catalog "that is different", listing over 300 of the world's best varieties.

5 BEAUTIFUL RARE VARIETIES $1.50 VALUE $1

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Jars, Vases, Sun Dials, Gazing Globes, Benches etc. in high fired enduring Terra Cotta

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Everything for the water garden. Our free Catalog contains much valuable advice and many illustrations.

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Plows
Seeds
Cultivates
Mows Hay and Lawns

A Powerful Tractor for Small Farms, Gardeners, Florists, Nurseries, Fruit Growers and Poultrymen.

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Walking & Riding Equipment

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Burroughs Observance

Elsewhere in this issue is told the intimate story of a friendship with John Burroughs, whose birthday we celebrate this third day of April. One of the observances will be held at the Grand Central Palace, New York City, under the joint auspices of the N. Y. State and City Federation of Women's Clubs. Mr. Alexander MacDonald, State Conservation Commissioner, George F. Unger and George J. Gillespie will be among the speakers. The meeting will be an all day affair and open to the public. Mrs. Charles Cyrus Marshall is chairman of the program.

Saving Lives

A chemical device to replace mufflers on automobiles, which will eliminate carbon monoxide gas, which has taken so many lives of careless automobilists, has been developed by Dr. J. C. Frazer, professor and chairman of the Department of Chemistry at Johns Hopkins University. His experiments now are confined to perfecting a practical device suitable for attaching to cars, and a company has been formed to manufacture it, once completed. The process, although now secret, is said to change the carbon monoxide into harmless carbon dioxide gas. It will be a welcomed product on the market.

Fight to Death

During the mating season, buck deer are very prone to quarrel, and occasionally their horns lock in battle in such a way that both are unable to feed, or become the ready victims of predatory animals. Grim evidence of such a tragedy was recently discovered by Robert Cowart on the Tosohatchie game preserve in the eastern part of Orange County, Florida. The skulls of two deer were found with the antlers attached and part of the skeletons remaining. Conditions indicated that the battle had taken place last September.

In South Carolina

Among the states wide-awake to the billboard problem in its relation to the beauties of the state is South Carolina. The State Federation of Women's Clubs is conducting an energetic campaign which is bringing very tangible results in awakening public sentiment. An effective little folder has been prepared and is available in connection with this work. Copies may be obtained from Mrs. John Drake, Columbia, South Carolina.

Buck Replaces Granger

Following the appointment of C. M. Granger to head the nation-wide survey of forest resources, C. J. Buck has been appointed to be District Forester of the Pacific Northwest National Forest District. He has been for some years in the Northwest office.

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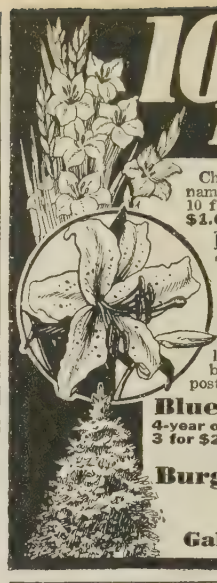
"ON WESTERN TRAILS"

10 Gladiolus Bulbs 10¢



Choice mixture of colors; finest named varieties; blooming size. 10 for 10c; 50 for 50c; 100 for $1.00; postpaid.

Regal Lily 10c

The finest of all Lilies, hardy everywhere. Immense clusters of flowers, with individual blooms 6 inches in length; stems 4 feet tall; color, white, slightly suffused with pink and a beautiful glow of canary yellow at center. One year old bulbs 10c each; 15 for $1.00, postpaid.

Blue Spruce 75¢
4-year old trees . . . .
3 for $2.00, prepaid.

Catalog Free

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Make the charm of your garden irresistible with a Lily Pool. Plan to grow these delightfully different flowers this season.

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Water Garden Booklet
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A dependable guide to building and planting the Lily Pool. Describes all types and varieties of Waterlilies and Water Plants; lists Ornamental Fish, Aquariums and Supplies. Send for your Copy NOW.

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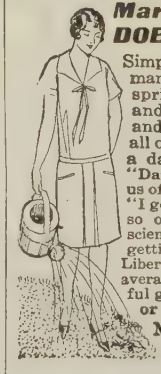
Kills Dandelions Easily

Marvelous New Treatment
DOES NOT KILL the GRASS



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IRIS ACRES, Molalla, Ore.

"Framing the Birds of Prey" is the title a highly informative pamphlet recently ublished. It calls the attention of all wild-'e lovers to the organized efforts that e being made to educate the public in the lief that the growing scarcity of game is ue to the ravages of "Vermin". To our ind the term "Vermin" is most fittingly plied to that class of human killers who e destroying America's incomparable ealth of beautiful and useful wild life, th game and non-game.

By campaigns of destruction, in which e arms and ammunition dealers are often e allies of the game killers, hawks, owls and gles, with little regard for any particular ecies, are being exterminated. Classed ith the real birds of prey as "Vermin" e many other birds, including herons, ingfishers, mergansers, grebes, loons, and licans, most of which are protected by ederal statute, and usually by state laws. y some of the methods of destruction, ch as the pole trap, outlawed in some laces by statute, and everywhere by en-ghtened public sentiment, other protected mall birds are frequently tortured and illed. Thus Federal and State Conserva-on laws are violated, the sentiment of the w-abiding and humane-minded public is utraged, and the people at large are being eprived of a part of their precious birth-ght—all by a single limited class of our tizens.

The pamphlet calls forcible attention to ne fact, daily becoming more evident, that hose who love our native birds in life are oming to out-number the killers, and are rowing in power.

It is announced that copies of this amphlet can be obtained free, while the upply lasts, from Davis Quinn, 3548 Tryon t., New York City.

Kiwanis Nature Trail

McKeesport, Pennsylvania, has a Nature Trail and it is not provided by the local chools, the local Nature club or by some ther naturally highly-interested source. It s provided and supported by the McKees-ort Kiwanis Club, which apparently is quipped with a large supply of vision and eal civic interest. If you are driving along he road just outside that city your eye vill be attracted by a rustic arch, on vhich, spelled in wood, is "Kiwanis Trail". f you linger,—which you are invited to lo because the trail is for all who are lecent enough guests to leave things un-ouched,—you will wander through an out-loor museum where the native flora grows ntouched, yet unobtrusively identified for ou with appropriate markers. It runs hrough a section which is sanctuary for irds, and the bird lover will see and hear nany of his avian friends. The trail, now ntering its fourth season was fathered by . W. W. Cowan, local physician, Kiwa-i n, and, of course, Nature lover. The b appropriated generously for its crea-i n and maintenance and has a trail com-ittee headed by Luke F. Savage. The City i McKeesport has cooperated in mainten-nce. Altogether it is a very happy idea. ell done, McKeesport Kiwanis Club has own the way. Who will follow?

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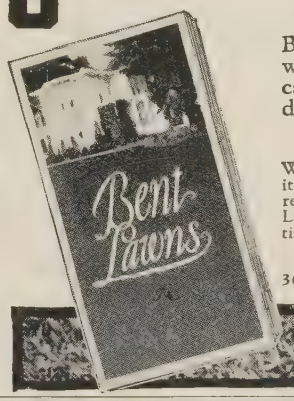

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THE BLUE CARNATION

BY BEN HUR LAMPMAN

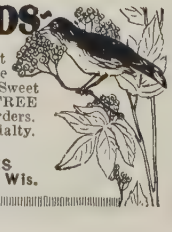
It is a worthy ambition the English florists have. They are endeavoring to grow a blue carnation, a flower never attempted by Nature, even in the multiplicity of variations that are wrought by cross-fertilization and by environment. And a blue carnation would be a handsome bloom; no such painful desecration of beauty as is the pitiful green carnation of St. Patrick's day, its petals dyed for the occasion. They give the fated white carnation a green cup to drink on the day before the festival, and it becomes that curious bilious blossom which commemorates the great ophidian drive. But a blue carnation, compounded of sun and rain and soil, skillfully shepherded by a true gardener—such a flower would be a triumph long to tell.

Gardeners have done much with flowers, and if they have aided Nature there should be none to chide them, since they have added to beauty's store as well. At most they have achieved only those effects which were possible in Nature, and which under fortuitous natural circumstances would have been wrought by the wise old mother herself. For that matter, improved and varied coloration, altered form and changed season, have all been the work of Nature manifesting herself through the skill and comprehension of good gardeners. Yet she yields not all, nor many, of her secrets. The blue carnation still eludes them.

Black tulips are grown nowadays for the perfumer, yet one seems to recall that the black tulip was once a floral ignis fatuus, dreamed of on a thousand pillows, yet ever somewhere out of reach. Of tulips generally it is true that no flower has been more greatly changed by the friendship and sympathy of the gardener than this one. A tulip once swept western Europe with a fervor for its culture that is comparable only to the buoyant projects of plantation days. Few tulips now resemble, save superficially, the wild stock whence they sprang, and cultivation has so divided the species as to render identification and naming difficult beyond practicability. The creation of new varieties in Holland, early in the seventeenth century, brought to pass such intemperate speculation and consequent ruin as caused the government to intervene. At the height of the frenzy as much as 1300 florins was paid for a single bulb, and stock companies were formed with such a bulb as their only asset. The tulip in your garden is historic. Ten to one its floral ancestors, in direct line, once set all Holland by the ears.

To search for the reason of color is not to grope in the dark, since with more or less difficulty the chemical constituents of floral colors have been segregated. This does not answer the question, however; for men cannot know why it is that a certain bloom

SHRUBS for BIRDS



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hould show a preference for the creation f yellow pigments, and another for those nat are scarlet, and a third for purple dyes. Vor can they comprehend the subtle chem- stry by which the flowers confirm their hoices. All that they do know is that proto- lasmic granules of colored pigments are resent in the petals, or in the cell fluids, nd often in strange yet ordered patterns. And they cannot guess why carnations are o sweetly stubborn about being blue.

Gardeners have tried these many years o create a blue rose, and there have been ome pretentions to the honor of achieve- ent. Yet the "blue" rose never is blue. It s a sickly compromise, far from cerulean nd altogether depressing to look upon. A ose as blue as the cornflower, a rose of Tyrian purple—what flowers they would e! Or a blue carnation. The reward is worthy of the quest.

ORANGE BLOSSOMS ON YOUR LAWN

BY G. G. NEARING

You can grow your own orange blossoms outdoors if your locality is no colder than Philadelphia—or even farther north by giving shelter and protection from the wind.

The Hardy Three-Leaved Orange (*Poncirus trifoliata*) will thrive unprotected in the open in southeastern Pennsylvania. Spring clothes it in large white fragrant flowers, and even more strikingly its golden fruits nestle among the dark leaves in October.

Do not try to eat them. Inviting though they look, the pungent gummy juice permits no liberties. Tiny oranges with lemon-like beak and a downy skin, their only uses are to beautify the landscape and bear their numerous seeds.

The Hardy Orange grows into a small gnarled tree twelve or fifteen feet high. The deep color of the leaves might lead you to hope that they will not fall, yet the grown tree is not an evergreen, though young specimens keep part of their leaves all winter where protected from the wind.

The winged twigs, however, retain their green color, and if regularly sheared, become so dense that the effect is almost that of an evergreen even after the leaves have fallen.

For a protective hedge Poncirus deserves high recommendation. Its thorns, an inch or two in length, offer a merciless front through which neither man nor beast can pass. It does not outgrow its place like the Osage Orange, nor put out long soil-robbing roots as many hedge plants do.

Furthermore it prefers a strong soil, even clay, and transplants easily at almost any season. In northern localities it is safest moved in spring or summer and with a ball of dirt.

The blossoms appear early in spring before the new leaves. They are real orange blossoms, but of two types. On some trees occurs a form with narrow petals, not nearly so fine as the normal shape. It is best to plant the broad-petal form.

A good tree of the Hardy Orange gives you three beauties—the bloom, the fruit, and the deep green foliage.

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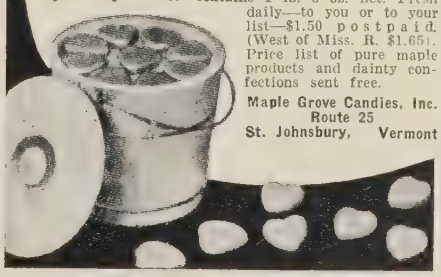

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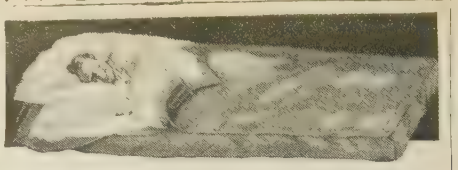

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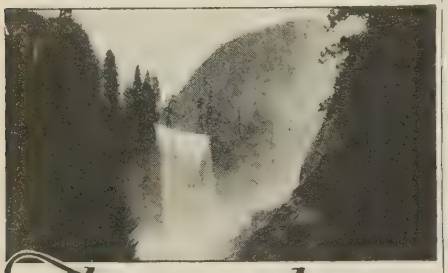

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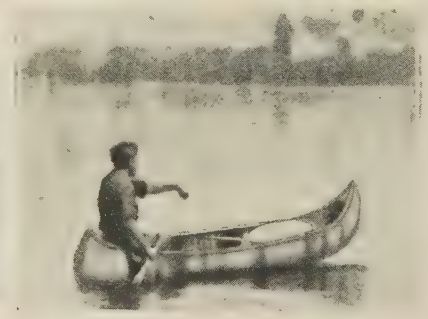

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"LITTLE TOAD WITH THE TINY TRUMPET"

BY COLIN CAMPBELL SANBORN
of Field Museum of Natural History

All countries hold strange and interesting forms of life; one a queer mammal, another a strange bird, and another curious insects or reptiles. Among the Amphibians are many species especially interesting on account of their unusual habits in the propagation of their race.

Darwin's Toad is, perhaps, the most remarkable example of this, for the male has all the cares of the family, while the female has only to lay the eggs. This toad lives in the cold, damp forests of Southern Chile, from Concepcion southward. It was first discovered in 1835, probably in the Province of Valdivia, by Darwin, who at that time was the naturalist on H. M. S. Beagle during her famous trip around the world. It was named *Rhinoderma darwini* in his honor.

During my recent work in Chile I was ever on the watch for this fellow. It was not until I reached Lake Riñihue in the Province of Valdivia that I found them in any numbers.

Lake Riñihue lies in the foothills of the Andes, surrounded by virgin forest, the wet mossy floor of which is never touched by sunlight. Little brooks of icy water flow down the hills, winding in and out among the trees, on their way to the lake. Here and there they form a small bog or swamp and in such places Darwin's Toads were very plentiful. From here they ranged through the forest until one could truthfully say, "the woods were full of them." The dark, gloomy forest echoed all day with their calling which is a soft whistled peeping repeated three or four times.

This little toad is not more than an inch long, including the tiny projection at the end of the nose. The Chileans call it *"el sapito con la trompita chiquita"* or "the little toad with the tiny trumpet."

While one might say that these toads all wear the same black and white trousers and vest, with variations in pattern, their coats are of different shades. Some are bright green, others dull green, some are grey, others tan or brown, and still others are almost black.

Darwin secured the first specimens of this species, but their remarkable breeding habits were reserved for subsequent discovery. The first observer to find individuals with abdomens swollen with young was Claudio Gay, the author of the famous "Historia de Chile." He supposed, and naturally enough, that these specimens were females, and that the young were born alive instead of being hatched from eggs.

More detailed examination by Jimenez de Espada, the great Spanish herpetologist, in 1872, revealed the fact that such swollen specimens were males. Also, that the pouch in which the young developed was in reality the enormously enlarged, internal vocal sac.

Most frogs and toads have some form of vocal sac, either external or internal, which can be widely distended when the animal calls. This sac is transformed into a brood pouch in Darwin's Toad. It lies just under the skin of the belly, and extends to the groin, covering the entire under surface of the body. Proportionately, it is the largest vocal sac to be found in any

the amphibians, but it probably never aches this unusual size except during the period of the development of the eggs and ung.

How the eggs are deposited and fertilized, d how they are placed in the mouth of e male parent, has never been observed. ne numbers of young found in a single tle varies from eleven to sixteen. The ergence, which is apparently not assisted any degree by the male, was observed by efft. He reports that they were deposited tadpoles, some before and some just ter the stage at which the arms appear ternally. Other observers have found cometely developed froglets in the pouch.

Many tropical frogs do develop cometely within the egg, and do not go rough a tadpole stage. The large yolks ith which the eggs are provided in such ses being sufficient for their entire per-d.

Many cases of peculiar breeding habits amphibians are found to be due to the sence of normal water conditions under hich our familiar species breed. It seems kely that in the case of Darwin's Toad, ne fact that they are found chiefly in the eighborhood of swiftly running mountain reams in which eggs would be swept away, as developed this curious habit on the part f the male. An extraordinary parallel to ese breeding habits is found among the ecan cat-fishes, in which the male carries ic eggs in his mouth until the young are atched.

It is to be hoped that some day a few Darwin's Toads will be brought here, that hey may be more intensively studied and nother of Nature's mysteries satisfactorily olved.

ALMOST A TRAGEDY—A JUNCO STORY

BY R. BRUCE HORSFALL

In company with others of his kindred n feathers, a small snowbird started on his outhern migration one beautiful day in arly October. They left the land from ome customary point of departure and truck out over the trackless waste of Atantic waters for the winter home in the outh. How he became separated from his ellow travelers one can not know. It may ave been that they had begun their jourey the evening before as most small birds lo, and he had lost contact and direction n the dark, and was now winging his way lone, a lost and tired little land-lubber.

The morning hours dragged slowly on vith no land in sight and only the restless waters beneath. Still he held bravely on confident that somewhere in the South was he land of his hopes and dreams, and knowing not that he had missed the direcion and was going ever farther out to sea. That the shores veer to the westward he ad no way of knowing.

At last—to his intense relief—for he must ve been nearing the end of his powers—ppeared in the distance the top of a dead ree—two trees in fact, and between them wo blackened stumps of still larger trees oken squarely off midway of their boles. ne yellow of the freshly broken tops shone the sun.

Where there were trees, there would be nd and the little traveler put forth all of

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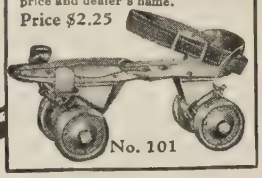

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his remaining strength to reach it, too tired to do more than just skim the dancing waters. He had been hours and hours on the wing.

Presently the land itself came into view. It was only a small blackened island of queer shape, but it was his only chance for a rest in all those troubled waters and he strove the harder. With an extra effort and with the aid of the back-draft of the moving vessel the little Junco dropped on to the taffrail and squatted unmindful of the many humans passing and repassing before him. Saved at last, but he could get no further. He was spent. An hour later he fluttered to a gentle hollow in the canvas of a covered life-boat.

Had we not been so far out at that particular time this Junco story would have had another ending. Until long past noon the birdling rested. Then the wind veered a trifle and brought down upon him a shower of biting, stinging cinders. That was too much for any bird to stand and he flew out behind the boat a short distance. Then apparently for the first time he saw a long curving snow bank glistening in the sun behind the queer island. Now, snow was his accustomed winter hunting ground and he gladly flew down to it only to sink deeply in when he tried to alight.

Again and again he essayed the seething shifting white band and I thought we had surely lost the little fellow as we left him far behind still endeavoring to find a foothold on the unstable waters. About an hour afterward I again espied him perched on the latticed rope under the hand-rail. When evening settled over the waters he was still with us having in the meantime picked up a few crumbs thrown out by kindly hands.

When the sun again rose over the sea we were passing Sandy Hook and although I did not see him go I have faith that the little Junco had left with the earliest streak of dawn and had found his real tree-covered land of promise, his goal through weary hours.

A Hiking Vacation

Dyrus and Edith Cook, artists of Woodstock, New York, have evolved some interesting and unique vacation trips for those who love to hike. They have selected neglected trails in the Catskill Mountains for these trips, five days in length and they sound interesting. Possibly some of our readers will be interested and we pass the information along, quoting three paragraphs from the announcement of the plan:

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Rich in imagination and charming in simple poetic form is *Around a Toadstool Table* by Rowena Bastin Bennett. The poems are about things of action and expressed much as the child mind sees them in all their newness and quasi-mystery. We have tried them on our four-year-old —who is, of course, an unusual child,—and her strict attention and insistence on a complete reading of the book is the best review we can give. Permit us, however, quotation of one verse, called "Under the Tent of the Sky", which goes:

The wind cracked his whip,
The storm flashed a gun,
And the animal-clouds marched one by one
Under the tent of the sky.

There were elephants, blue,
And shaggy white bears,
And dozens and dozens of prancing gray mares
With their beautiful heads held high.

In a review of this charming book of verse for youngsters, it would be unfair not to mention the delightful drawings made for it by Lucille Webster Holling. They have caught the author's verve in fine fashion. The publishers are Thomas S. Rockwell Company, 209 W. Jackson Boulevard, Chicago. The book is listed at two dollars and we heartily recommend it.

R. W. W.

Scientific Book Club

Those interested in Nature and Science now have a book club themselves in the Scientific Book Club. It is fashioned along the prevailing lines of a book-a-month, but specializing in books of interest to the layman who has a flair for the scientific. A distinguished editorial committee and advisory board assures that its selections will be worth while. The club announces that "although strictly authentic, books recommended are not technical in any narrow sense, but are written in a manner to be clear and understandable to the lay reader." It is planned to cover all branches in science during the year.

New Bulletins

Three new bulletins that have come to hand and are of more or less specialized interest. *The Habits and Economic Importance of Alligators,* being Technical Bulletin No. 147 of the U. S. Department of Agriculture, considers the state of the alligator today with relation to commerce and civilization. It is by Remington Kellogg. *Quaking Aspen,* being Technical Bulletin No. 155 of the U. S. Department of Agriculture, is a study in applied forest pathology written by E. P. Meinecke. *New Land and Fresh-Water Mollusks from South America,* written by William B. Marshall and published by the Smithsonian Institution, covers what the title suggests.

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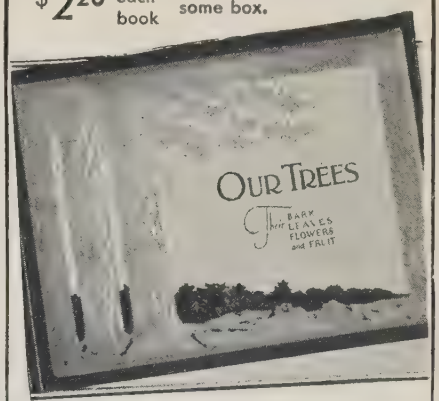

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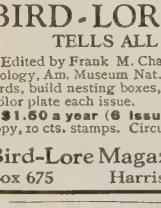

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The Insect World

From our experience birds seem to hold the interest of the majority of Nature lovers while insects appear to run a rather close race with wild flowers for second place. The range of the insect world, of course, is wider than the others, and hence often more baffling. But by reason of its immensity of forms its fascinations are multiplied. If there is any volume which will tend to make one "insect conscious" it is *Insect Ways* by Clarence M. Weed, just issued from the presses of D. Appleton and Company. Its author needs no introduction to those acquainted with worthwhile Nature writing, and in this latest book he has told, with his usual charming style, a fascinating story. It should be read before the Spring is upon us, because the stories it tells will make our spring and summer walks the more fascinating for the interesting events of the insect world we will be inspired by this book to observe. It is listed on our Book Page and may be ordered through Nature Magazine.

For The Gardener

Gardeners will find it extremely helpful to add to their library a copy of *Herbaceous Perennials* and they can do so for the expenditure of fifteen cents sent to the Superintendent of Public Documents, Washington, D. C. This booklet is Farmers' Bulletin No. 1381 of the U. S. Department of Agriculture and is the work of Furman Lloyd Mulford. It deals with the use, arrangement, culture and propagation of herbaceous perennials and gives regional data on their planting. The bulletin goes beyond the plants ordinarily listed by dealers and makes many valuable suggestions which should be of distinct value to gardeners. When such excellent bulletins as this come to our desk from the Government Printing Office, we are often moved to regret that more people are not acquainted with and taking advantage of such services as this one, performed for them by their government.

Bird Rhymes

Some time ago we reviewed with pleasure a little volume of verse under the title of *Bird Rhymes*. The author is Bert Dayton. The book has been generally well received and is now brought out in a less expensive edition with paper cover. The present price of the little book is thirty-five cents and four copies may be had from the Palisade Press, 125 Church Street, New York City, for one dollar.

Poems For The Tots

In *Little Poems for Little Folks,* Viola Dare has presented a group of short and whimsical little rhymes designed to be read and reread to the youngsters in those moments when reading is the next thing to be done. The Stratford Company, Boston, are the publishers and the price is one dollar.

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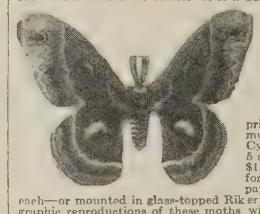

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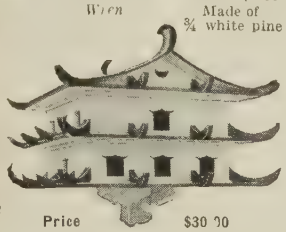

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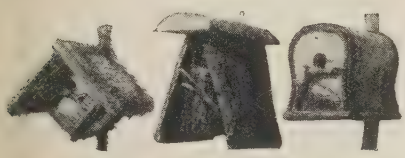

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Tree and Flowers

We have received many requests from readers as to where might be obtained pictures in color for use in tree identification work. We have, until now, been forced to admit we didn't know of any. Now there comes for review copies of *Our Trees* and *Our Wild Flowers*, which fill the demand in considerable measure, not only for trees but also for wild flowers. These books are interesting and different from anything we have thus far encountered. In the tree book we first find colored pictures of forty-eight trees,—showing the tree, bark, leaves and fruit. There are six to a sheet with gum on the back so the sheets may be cut out and pasted on subsequent blank pages. Following the pictures comes condensed descriptive matter on the trees, then pages prepared for the entering of a record of the name, place and time of discovery and remarks. Another gummed sheet is provided for the labeling of specimens and mounting them. In the back of the book is secured a heavy manila envelope to contain the specimens. The whole result of the use of the book will be a personally-made-up album of one's tree identification activities. The same idea is followed out with the flower book. The books sell for two dollars each and are brought out by Samuel Gabriel Sons and Company, New York City. The separate gummed sheets together with the descriptive matter are sold separately at fifty cents a set.

Another Carillon

Publication in our Florida issue of the etching of the Bok Singing Tower at Lake Wales, Florida, brought much appreciative comment. Miss Enid Johnson of Simcoe, Ontario, Canada, writes in appreciation and also sends us a picture of another carillon. This stands in Simcoe and was erected as a memorial to the men from the County of Norfolk who fell in the Great War. The carillon has twenty-three bells. It was dedicated in 1925 and programs of concerts have been played upon it since then.

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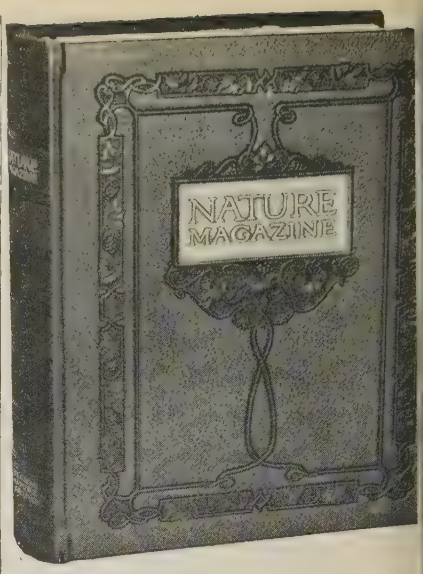

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He said to some of His followers (Mark 11:24): "What things soever ye desire, when ye pray, believe that ye receive them, and ye shall have them." It is a promise that *anyone* may get *anything* he wants, by praying for it—that is, by praying for it in a *certain* way.

Again Jesus said to certain followers who were worrying about their physical and financial affairs (Luke 12:31): "But rather seek ye the kingdom of God; and all these things shall be added unto you." There can be no doubt about what this promise means—especially if we read the context beginning at verse 22. It clearly and simply means that if one can find the Kingdom of God, his physical and financial problems will solve themselves—that there will be "added" unto him the things necessary to his happiness.

The tragedy of it is that these promises are not generally fulfilled in the lives and affairs of Christian people. Millions have diligently sought the Kingdom of God for years without finding it—without having anything much added to them. They have prayed earnestly for things and conditions they desired, without getting them. Millions of these good people, in the churches and out of them, are cramped and hampered by poverty, limitations, lack, sickness, worry and disappointment.

But there is nothing wrong with these promises of Jesus. The trouble is that men and women have failed to understand and use them correctly. They have thought the Kingdom of God is a place or condition outside of themselves, whereas Jesus said (Luke 17:21): "The Kingdom of God is within you." They have understood Him to say, in reference to praying for the things they want: "Believe that ye shall receive them," *and that is not what He said,* nor will such belief get what Jesus promised they should.

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CHRISTIAN PSYCHOLOGY is given to the world by Judge Daniel A. Simmons, whose gifts to the world are already so rich and full. He is widely known as a psychologist, author, teacher, and lecturer. He is now, and for more than fifteen years has been, one of the judges of the highest trial court in his state. He is the founder of The American Institute of Psychology, with its thousands of students all over the world, and highly prizes the great mass of marvelously happy achievements that these students have reported as results of his teachings.

CHRISTIAN PSYCHOLOGY is Judge Simmons' crowning work—a work in which the Christ-light shines forth as the true light of the world, leading men and women on to higher, nobler, happier and more abundant life. He has set forth its fundamental principles in a marvelous soul-thrilling lecture of 6,000 words entitled "The Kingdom of God," in which he tells just what the Kingdom of God is, where it is, and how to set out to find it and enjoy its rich rewards. A manuscript copy of "The Kingdom of God" will be

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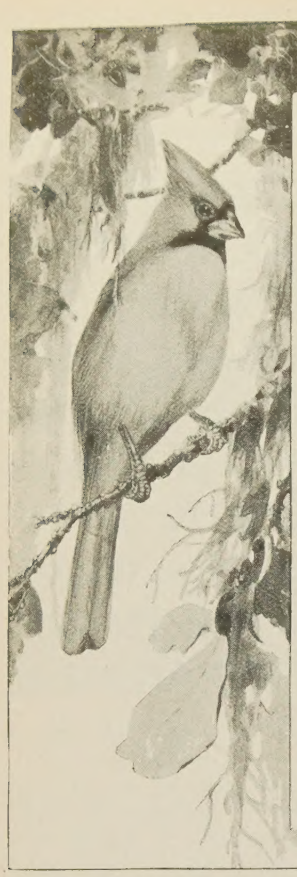

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The Association directs encouragement of tree planting by the public; disseminates popular forestry news for the information of editors of the daily press; and compiles and distributes forestry news and reports on legislative progress for assistance of active foresters in the field.

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Forestry Foundation of University of Michigan Honors George Willis Pack

School is Chosen Because of Facilities for Teaching Forestry and Because of Experienced Staff, Says Donor

PROMOTION of practical forest land management in the broadest sense of the term is the object of a gift of $200,000 made by Charles Lathrop Pack of the American Tree Association to the University of Michigan. This fund is to be known as the George Willis Pack Forestry Foundation in memory of the donor's father, and the income from it will be used by the School of Forestry and Conservation in carrying out the purpose of the Foundation.

In establishing the Foundation, Mr. Pack stated that the School of Forestry and Conservation was chosen as the medium through which to carry out his plans for the advancement of forestry in this field "on account of its prestige, its facilities for teaching the broad principles of all phases of practical forestry, and its experienced staff."

The income from the Foundation is to be used for the salary and expenses of an experienced forester to be known as the George Willis Pack Professor of Forest Land Management, and for such other expenditures as may be necessary in carrying out the purposes of the Foundation. In accordance with the wishes of the donor, who is keenly interested in the practical application of forestry, it is expected that the holder of this professorship will devote the larger part of his time to furthering the practice of forestry in the woods rather than in the classroom. He may, however, assist in the instructional activities of the School, and will doubtless work particularly with graduate students. He will be expected to spend considerable time in travel in order to keep in close touch with forest conditions and practices in other parts of the country and to make the results of his experience as widely available as possible.

Charles Lathrop Pack has devoted his life to forestry and conservation. His father, George Willis Pack, in whose honor the Foundation is named, went to Michigan from Madison County, New York, traveling by the Erie Canal to Buffalo and thence by boat to Port Huron, Michigan. Shortly after his arrival, he and his father, George Pack, built one of the early sawmills in Michigan at Pack's Mills on the Black River.

Mr. and Mrs. Pack spent their early married life in Fort Gratiot, the site of which is now occupied by the northern part of the city of Port Huron. During their life at Fort Gratiot, Thomas Edison and his mother, living just outside the fort, furnished the families living in the former officers' houses with chickens and eggs.

Afterwards Mr. Pack was a prominent citizen of Cleveland, Ohio, and still later became the leading citizen of Asheville, North Carolina, whose public square was named after him. The citizens of Asheville built the George Willis Pack Memorial Library in his honor. His portrait hangs in the Asheville Courthouse, together with the portrait of Jefferson Davis and the late Senator Zeb Vance. George Willis Pack was elected a Regent of the University of Michigan in 1857, but resigned shortly afterward because of his decision to start on an extended exploration of the timber regions on the shores of Lake Superior, and of Minnesota and Wisconsin.

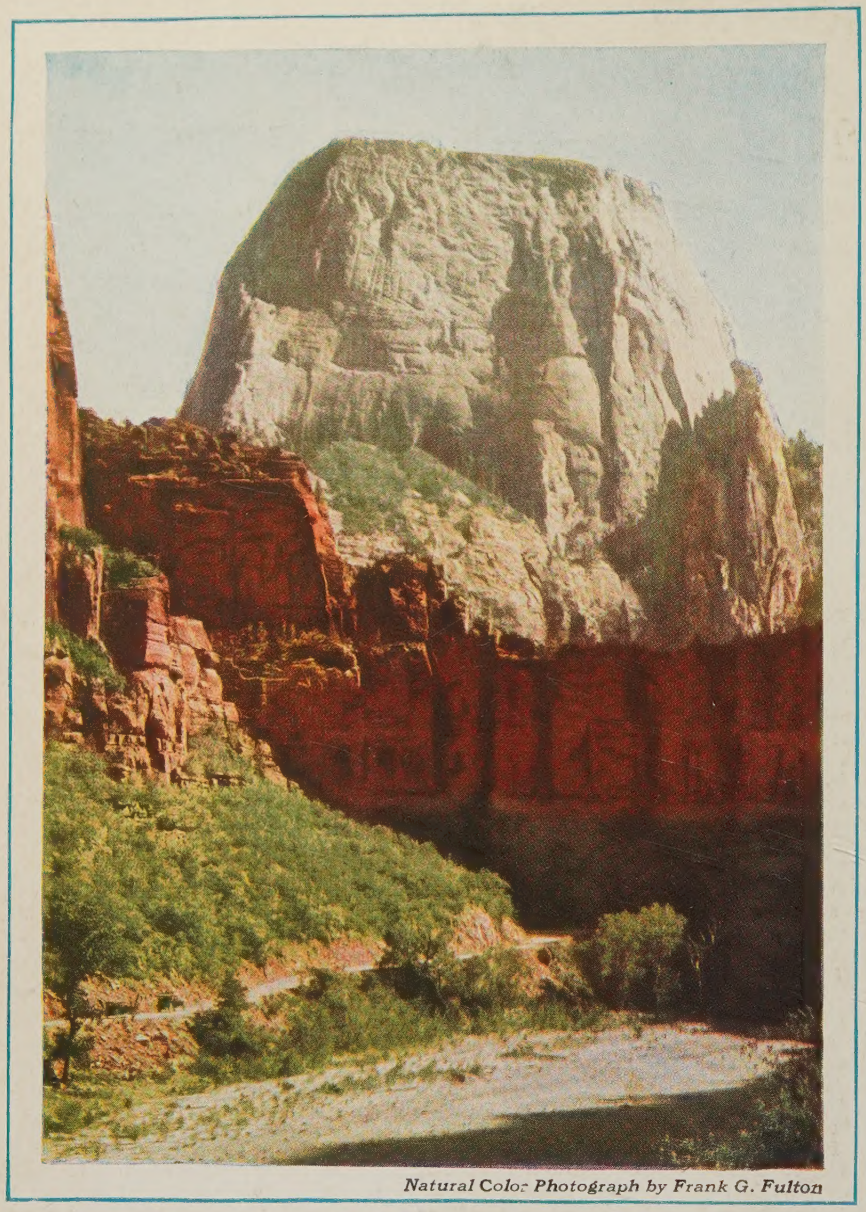
In commenting upon the gift, Dean Samuel T. Dana of the School of Forestry and Conservation stated that the income from the George Willis Pack Forestry Foundation will be used, in accordance with Mr. Pack's wishes, for two major purposes—to develop the wild land properties owned by the University, and to cooperate with forest land owners in bringing about the practice of forestry and more profitable methods of forest management of privately owned lands.

"The University of Michigan," said Dean Dana, "has three small areas of forest land in the vicinity of Ann Arbor, which are used both as outdoor laboratories for the instruction of students and for investigative purposes, and which are already under careful management. In addition to these, the University owns approximately 6,300 acres of wild lands in the northern part of the state, and it is probable that the new professor will devote a large share of his attention to the development of these as demonstration and experimental forests.

"As a state," continued Dean Dana, "Michigan offers unusual opportunities for work of this sort. The Upper Peninsula still has large areas of untouched hardwoods which, properly handled, need never be converted into waste land as was the case with the wonderful forests of pine which once covered the northern half of the Lower Peninsula. These are now absolutely gone and the severely burned sandy barrens which have followed them offer one of the most acute problems before the state. At present these lands are so unprofitable that many of them are reverting to the state because the owners are unable to meet taxes. Thus, the problem of maintaining present forest resources and of reestablishing new growth on once forested but now denuded land is very pressing and renders Mr. Pack's gift peculiarly acceptable not only to the University of Michigan, but also to the state."

Cooperation with other forest land owners will involve a thorough study of present methods of operation and possible modifications, a comparison of the silvicultural and financial results being obtained under the present methods with the probable results under improved methods, and finally the actual trying out in commercial practice of those methods which promise most in the way of forest improvement and economic returns. Tests of this sort will constitute one of the best possible demonstrations of forest land management and also one of the best possible ways of convincing private owners that forestry is not only practicable but profitable. Cooperation with the state and federal government in the handling of state and federal forest lands will also be developed as opportunity offers.

According to Dean Dana, Michigan affords a peculiarly favorable opportunity for effective work in the field of Mr. Pack's special interest. The large areas of virgin hardwood timber which still exist in the Northern Peninsula and the millions of acres of cut, burned, and largely barren forest land in the northern half of the Lower Peninsula offer a forest and economic problem of outstanding importance not only to Michigan, but also to the country as a whole. In making funds available for thorough-going study along these lines, Mr. Pack is enabling the School of Forestry and Conservation to undertake important activities in which it is keenly interested but for which adequate funds are not likely to be available.



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